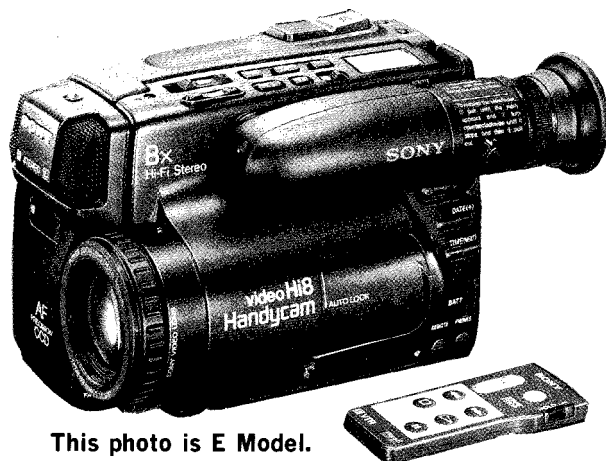


CCD-TR81/CCD-TR705E

RMT-S04

SERVICE MANUAL



This photo is E Model.

Remote commander is available as a unit.

AEP Model
UK Model
E Model
Australian Model

video Hi8
Handycam

FL MECHANISM

For MECHANISM ADJUSTMENTS, refer to the "8mm Video MECHANICAL ADJUSTMENT MANUAL H" (9-972-705-11).

SPECIFICATIONS

Video recording system	Four Rotary heads, Helical scanning FM system
Audio recording system	Four Rotary heads, Helical scanning FM system
Video signal	PAL color, CCIR standards
Usable cassette	8 mm video format cassette (Hi8 or Standard 8 mm)
Tape speed	SP mode: Approx. 20.051 mm/sec (13/16 in)/sec. LP mode: Approx. 10.058 mm/sec (13/32 in)/sec.
Recording lime	SP mode: 1 hour and 30 minutes (E5/P5-90) LP mode: 3 hours (E5/P5-90)
Playback time	SP mode: 1 hour and 30 minutes (E5/P5-90) LP mode: 3 hours (E5/P5-90)
Fast-forward/rewind time	Approx. 8.5 min. (E5/P5-90)
Image device	CCD (Charge Coupled Device)
Viewfinder	Electronic viewfinder (black and white)
Lens	Combined 8 x power zoom lens (=7.8—62.4 mm (5/16 to 2 1/2 inches), F= 1.6—2.2 37 mm (1 1/2 inches)

Auto focus system	TTL autofocus system inner focus wide macro system
Color temperature	Automatic, HOLD, ^ (indoor) 3,200 K ^, (outdoor) 5,800 K
Minimum illumination	2 lux (F 1.6)
Illumination range	2 lux — 100,000 lux
Recommended illumination	More than 100 lux
Aperture correction	Automatic
S video input/output (AEP/UK model: Output only)	4-pin mini-DIN Luminance signal: 1 Vp-p, 75 ohms, unbalanced, sync negative Chrominance signal: 0.3 Vp-p 75 ohms, unbalanced
Video input/output (AEP/UK model: Output only)	Phono jack, 1 Vp-p, 75 ohms unbalanced sync negative

—continued on next page—

MICROFILM

VIDEO CAMERA RECORDER
SONY

Audio input/output (AEP/UK model: Output only)

Phono jacks

Input: -7.5 dBs, input impedance
more than 47 kilohms

Output: -7.5 dBs, (at output
impedance 47 kilohms)
impedance less than
2.2 kilohms

DC OUT Special minijack, DC 5 V

Headphones jack

Stereo minijack

Remote jack Stereo mini-minijack

MIC jack Stereo minijack, -66 dBs, low
impedance with 2.5 — 3 V DC
output, impedance 6.8 kilohms

General

Power requirements

On battery mounting surface

6.0 V (battery pack)

7.5 V (AC power adaptor)

9.0 V (alkaline batteries)

Power consumption

5.5 W (camera recording)

including the viewfinder

Installation Vertically, Horizontally

Operating temperature

0°C to 40°C (32°F to 104°F)

Storage temperature

-20°C to + 60°C

(-4°F to + 140°F)

Dimensions Approx. 109 x 105 x 178 mm
(w/h/d) (4 3/8 x 4 1/4 x 7 1/8)

Weight Approx. 790 g (1 lb 12 oz)
excluding the battery and
cassette

Microphone Electret condenser microphone,
stereo type

Supplied accessories

See page 5.

Design and specifications are subject to
change without notice.

SAFETY CHECK-OUT

After correcting the original service problem, perform the following
safety checks before releasing the set to the customer:

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
4. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
5. Check the B+ voltage to see it is at the values specified.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK  OR DOTTED
LINE WITH MARK  ON THE SCHEMATIC DIAGRAMS
AND IN THE PARTS LIST ARE CRITICAL TO SAFE
OPERATION. REPLACE THESE COMPONENTS WITH
SONY PARTS WHOSE PART NUMBERS APPEAR AS
SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

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Introduction

Overview of the CCD-TR705E

The CCD-TR705E Video Hi8 Handycam is a compact color video camera/recorder (camcorder). You can use it to shoot the pictures you want and play them back on your television set. It is equipped with a Hi-Fi stereo recording system which offers high quality sound to match the Hi8 picture. The camcorder uses 8 mm video-format cassettes.

Who This Manual is for

This manual is for you. You can use this manual to find exactly the information you need, whether you are familiar with video equipment or not.

How the Manual is Organized

The first section of the manual explains the preliminary steps necessary to prepare for shooting and playing back.

Other sections include shooting procedures that show you how to use the various features and functions of your camcorder. If you are a beginner, start with "Recording with automatic adjustments." If you are very familiar with camcorders, try to shoot your picture with manual adjustments as well as automatic adjustments.

If you want to start recording right away, see p.32 through 38.

The manual also includes information on how to play back a picture on a TV and how to edit your original 8 mm tape onto another video tape.

If you have any problems during operation, see the "Trouble Check" section (page 86).

How This Manual Works

Use the information below to help you follow the instructions in this manual.

- Controls and settings on the camcorder are shown in capital letters:

ex. Set **POWER** to **CAMERA**.

- The letters in illustrations correspond to a letter in the text:

ex. (A-1) or [a]

- Step numbers in all illustrations correspond to the step numbers in the text.

- Notes and cautions are set apart with lines.

ex.

Note on battery life

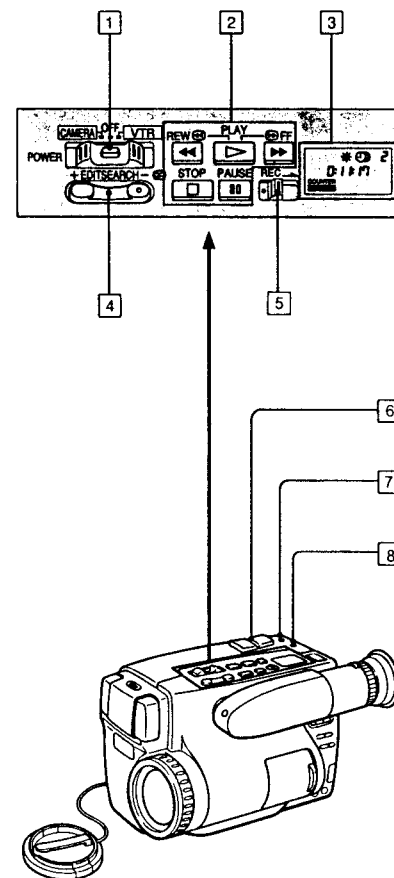
Battery will not last as long in cold places.

Supplied Accessories

The camcorder is packed together with the following units. Check to see that everything is contained in the package. (* Attached to the camcorder.)

- Wireless Remote Commander (1)
- Remote Commander Holder (1)
- A/V connecting cable (3 phono to 3 phono) (1)
- S VIDEO connecting cable (4-pin mini DIN to 4-pin mini DIN) (1)
- Battery pack NP-55 (1)
- AC power adaptor AC-V30 (1)
- Lithium battery CR2025 (2)
- RFU adaptor RFU-90AS (1) or RFU-90E (1) or RFU-89EA (1) with an aerial selector and a screwdriver.
- Shoulder strap (1)
- Jack cover (1)*
- Lens cap (1)*
- Cassette tape (1)
- Handy Manual

(A-1)



Identifying the Parts

For details on the use of each control, refer to the pages indicated in the circle.

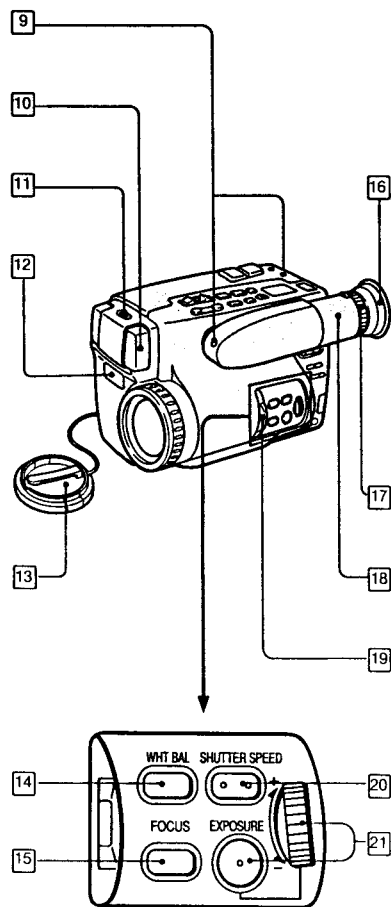
(A-1)

- POWER switch**
CAMERA: For camera recording
VTR: For playing back or editing tapes
OFF: Power off
- Tape transport buttons**
▷ PLAY (playback)
▶▶ FF (fast forward)
◀◀ REW (rewind)
□ (stop)
⏸ (pause)
- Display window** ③
- EDIT SEARCH** ④ button ⑤ — ⑥
- REC (recording) switch (E/AUS MODEL)**
Slide in the direction of the arrow for recording. ⑦, ⑧
- POWER ZOOM button** ⑨
- RESET button**
Press to reset the counter zero.
- ZERO MEM (zero memory) button** ⑩
Use to memorize the counter zero point.

SECTION 1 GENERAL

This section is extracted from instruction manual of E Model.

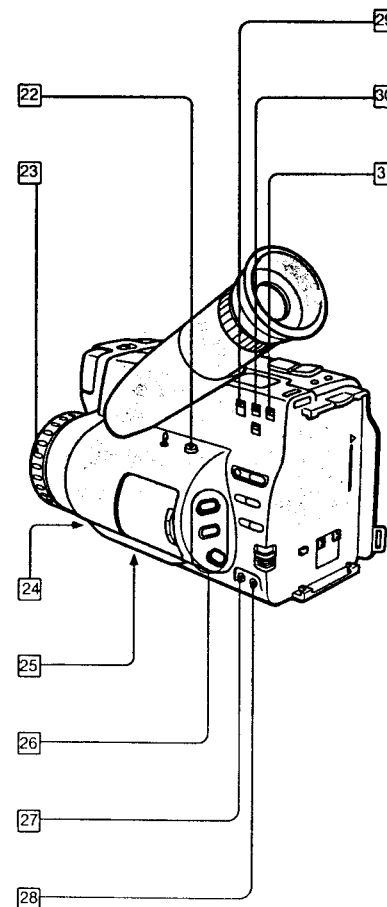
(A-2)



(A-2)

- 9 Camera recording/battery lamp**
Lights during camera recording. It flashes when the battery is discharged.
- 10 Built-in microphone (stereo)**
- 11 BUILT-IN MIC switch**
Usually set to the green position. When using the camcorder in a strong wind, set to "WIND".
- 12 Remote sensor**
- 13 Lens cap**
To remove the lens cap, squeeze the sides. Hook it on the grip strap so it will not get lost.
- 14 WHT BAL (white balance) button**
- 15 FOCUS button**
Used for manual focusing.
- 16 Eyecup**
- 17 Viewfinder lens adjustment ring**
Adjust to your eyesight to assure good focus. Be sure to adjust this ring when shooting for the first time.
- 18 Viewfinder**
You can monitor the monochrome picture being recorded or played back. The caution indicators and function modes also appear here.
- 19 AUTO LOCK cover**
- 20 SHUTTER SPEED button**
Used to select the shutter speed.
- 21 EXPOSURE button and EXPOSURE dial**

(A-3)



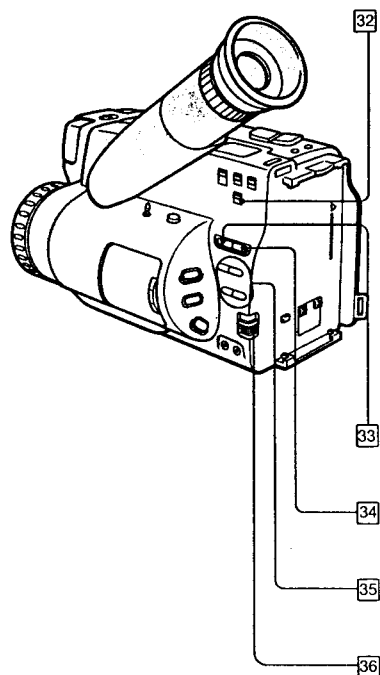
(A-3)

- 22 REC START/STOP button**
Use when recording in a low position.
- 23 Focus ring**
- 24 FADER button**
- 25 Lithium battery compartment**
- 26 Superimpose buttons** —
MEMORY button
COLOR/MODE button
SUPERIMPOSE ON/OFF button
- 27 REMOTE (LANC) * control jack (stereo mini-mini-jack)**
Connect a wired remote control unit, an editing controller, or other equipment here.
- 28 PHONES (Headphones) jack (stereo mini-jack)**
- 29 Hi-Fi SOUND switch**
Set to the appropriate position when playing back the tape.
- 30 REMOTE COMMANDER ON/OFF switch**
Set to ON when using the supplied Remote Commander.
- 31 HIFI AUTO/OFF switch**
Usually set to AUTO. When recording with the standard 8 mm video system regardless of the type of the tape which you use, set to OFF.

***About (LANC)**

(LANC) stands for Local Application Control Bus System. The (LANC) connector is used for controlling the tape transport of video equipment and the peripherals connected to it. This connector has the same function as the connectors indicated as CONTROL L or REMOTE.

(A-4)



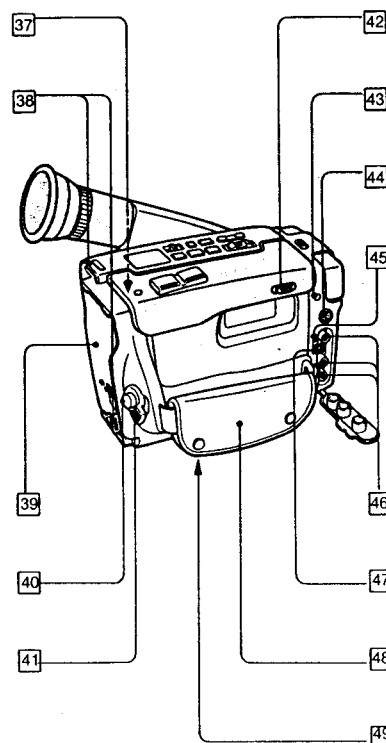
(A-4)

- 32 Recording mode/EDIT switch** ② ③
Switch it depending on the operating mode.

Mode	Recording	Playback	Editing
Setting	EDIT ↓ SP ↓ LP RECMODE	EDIT ↓	EDIT ↓
Function	Recording mode switch	EDIT switch	

- 33 SUMMER TIME button** ④
Press to set summer time after setting the date and time.
- 34 AREA button** ⑤
Press to set the time of the place where you live or to adjust the time of the place to where you are using the camcorder.
- 35 DATE (+) and TIME (NEXT) buttons** ⑥
Press to display or turn off the date or time.
- 36 BATT (Battery eject) knob** ⑦
Press to remove the battery.

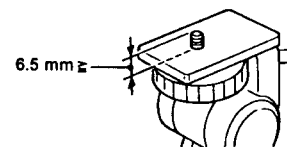
(A-5)



(A-5)

- 37 EJECT button (below the lid)** ⑧
Press to lift up the cassette compartment and to open it automatically.
- 38 Hooks for shoulder strap**
Attach the shoulder strap.
- 39 Battery mounting surface**
- 40 START/STOP button** ⑨
Press to start and stop camera recording.
- 41 STANDBY switch** ⑩
Turn it up to set the camcorder to the standby mode.
- 42 Lid lock** ⑪
Slide to the left to open the cover.
- 43 MIC jack (PLUG IN POWER) (stereo minijack)**
To connect an external stereo microphone (not supplied).
- 44 S VIDEO connector (4-pin mini-DIN connector)** ⑫ - ⑬, ⑭, ⑮
- 45 VIDEO/AUDIO INPUT/OUTPUT selector switch** ⑯ (E/AUS MODEL)
- 46 VIDEO/AUDIO jacks (phono jacks)** ⑰ - ⑱, ⑲, ⑳
- 47 DC OUT (RFU adaptor DC output) jack (special minijack)**
Attach the supplied RFU adaptor here if necessary. This jack also supplies power to an external microphone.
- 48 GRIP STRAP** ㉑
Adjust the length so that your thumb can easily manipulate the START/STOP button.
- 49 Tripod receptacle** ㉒

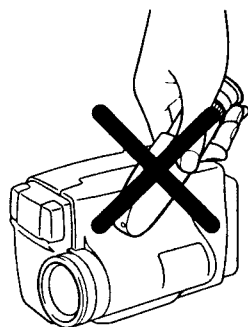
(A-6)



Note (A-6)

When attaching a non-SONY tripod, make sure that the length of the camera mounting screw is less than 6.5 mm (9/32 in.). Otherwise, the screw may damage the inner parts of the camcorder.

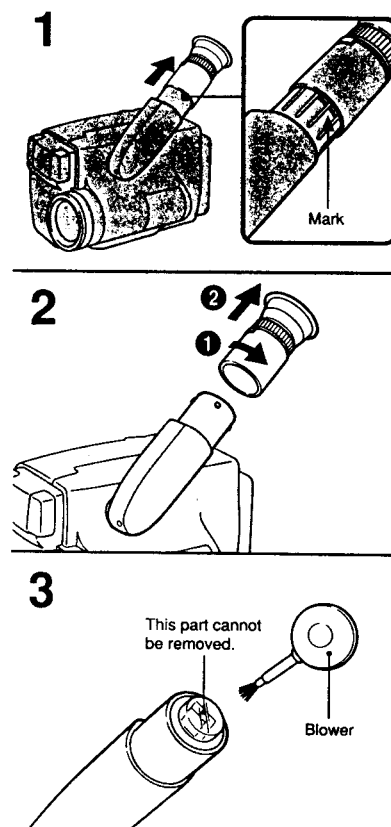
(A-7)



Caution (A-7)

Do not pick up the camcorder as shown in the illustration.

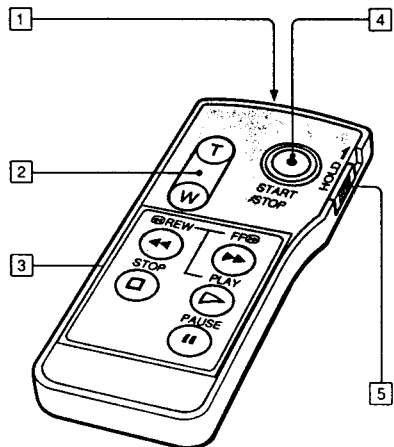
(A-8)



To remove dust from inside the viewfinder (A-8)

- 1 Pull out the viewfinder barrel until the mark appears.
- 2 Turn it counterclockwise until it stops (①) and pull it out (②).
- 3 Clean the surface of the cover with a blower.

(A-9)



Wireless Remote Commander

You can remotely record or play back a tape. The buttons on the Remote Commander with the same name or same mark as those on the camcorder have the same function.

When you use the Remote Commander

Be sure to set the REMOTE COMMANDER ON/OFF switch on the camcorder to "ON", and then start operation of the camcorder, with the Remote Commander pointing towards the remote sensor. (See "Remotely controllable area" on page 13.)

(A-9)

1 Transmitter

2 Power zoom button

3 Tape transport buttons

- ◀ REW (rewind) button
- ▶▶ FF (fast forward) button
- STOP button
- ▷ PLAY button
- ⏸ PAUSE button

4 START/STOP button

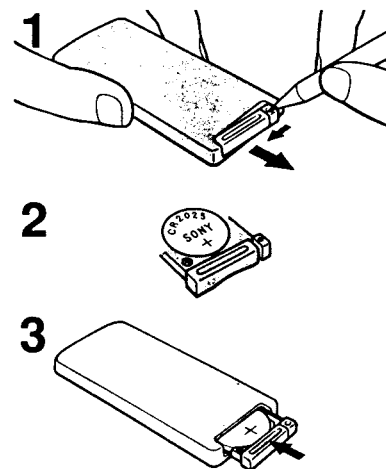
5 HOLD switch*

Slide in the direction of the arrow to prevent the buttons from being accidentally depressed.

Note

The * indicates a function which is operable only with the Remote Commander.

(A-10)



Installing the Lithium Battery (A-10)

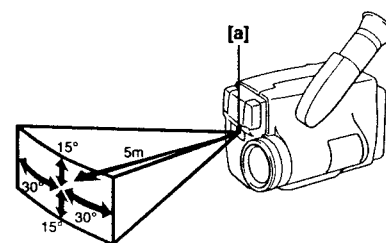
Install the supplied CR2025 lithium battery into the Remote Commander with the polarities positioned correctly.

1 Pull out the lithium battery holder from the Commander.

2 Install the lithium battery with the + side facing upward.

3 Put the lithium battery holder back into the Commander.

(A-11)



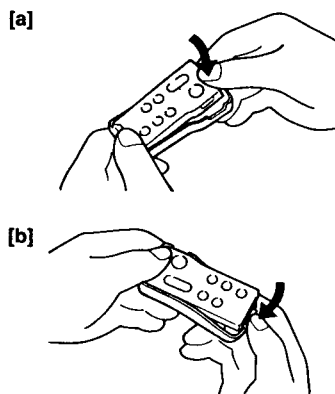
Remotely controllable area (A-11)

Point the Remote Commander towards the remote sensor [a].

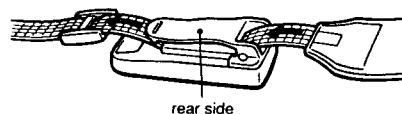
Notes on the Remote Commander

- Keep the remote sensor away from strong light sources such as direct sunlight or illumination. Otherwise the Remote control may not be effective.
- Be sure that there is no obstacle between the remote sensor and the Remote Commander.
- The command mode of the Commander is VTR2. Avoid using Sony VTRs with the same command mode at the same time.
- Be sure to set the REMOTE COMMANDER ON/OFF on the camcorder to OFF when you connect the receiver of a remote control kit (not supplied) to the REMOTE control jack.

(A-12)



(A-13)



Lithium battery life

The battery lasts for approximately 6 months under normal operation. When the Remote Commander does not work, the lithium battery becomes weak or dead. In this case, replace the battery with a Sony CR2025 or Duracell DL-2025. Use of any other type of battery may present a risk of fire or explosion.

CAUTIONS

- Keep the lithium battery out of the reach of children. Should the battery be swallowed, immediately consult a doctor.
- Wipe the battery with a dry cloth to assure a good contact.
- Be sure to observe the correct polarity when installing the battery.
- Do not hold the battery with metallic tweezers, otherwise a short-circuit may occur.
- The Battery may explode if mistreated. Do not recharge, disassemble, or dispose of in fire.

Attaching the Remote Commander to the Remote Commander holder (A-12)

- [a] When attaching the Remote Commander to the Remote Commander holder.
- [b] When detaching the Remote Commander from the Remote Commander holder.

You can clip the Remote Commander holder on your coat pocket or belt, or slide it onto a shoulder belt before attaching the Remote Commander to it.

(A-13)

Preparing your camcorder 1

Connecting the Power Sources

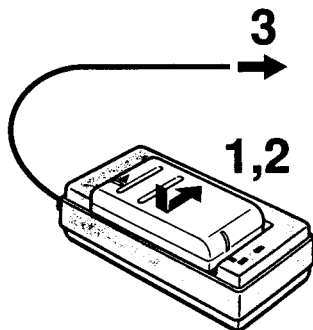
First, Choose the Power Source.

Place	Power source	Accessory to be used
Outdoors	Battery pack	Battery pack NP-55 (supplied), NP-77, NP-77H, NP-77HD
	Alkaline batteries	Battery case EBP-77
Indoors	House current	AC power adaptor AC-V30 (supplied), AC-V55, AC-S10
In the car	12V or 24V car battery	DC pack DCP-77, AC power adaptor AC-V55 and the car battery cord DCC-16AE

Note on power source

Disconnecting the power source or removing the battery pack during recording or playback may damage the inserted tape. In this case supply power again immediately.

(B-1)



Using the Battery Pack

Step 1

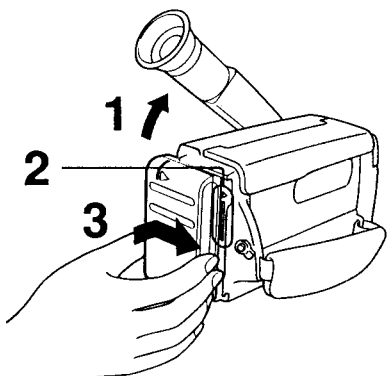
Charge the battery pack. (B-1)

- 1 Align the right side of the battery pack with the line on the AC power adaptor.
- 2 Slide in the battery pack to the right.
- 3 Connect the AC power adaptor to a wall outlet.

	NP-55	NP-77H/77HD	NP-77
Required charging time	60	140	120

(approx. minutes using AC-V30)

(B-2)



See the instruction manual of the AC power adaptor for details.

Step 2

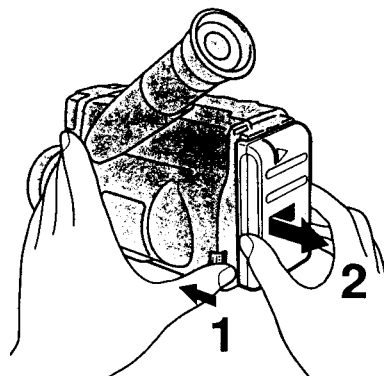
Mount the battery pack on the camcorder.

(B-2)

- 1 Lift up the viewfinder.
- 2 Align the right side of the battery pack with the white line on the camcorder.
- 3 Slide the battery pack to the right.

Note: Make sure the battery fits completely on the mounting surface of the camcorder. An imperfect fit may damage the projections on the camcorder.

(B-3)



To remove the battery pack (B-3)

While pressing the BATT knob in the direction of the arrow, slide the battery pack to the left and pull it out as illustrated.

Battery life

A fully charged battery pack lasts for:

	NP-55	NP-77H/77HD	NP-77
Battery life	60	150	120

(approx. minutes, continuous recording indoors)

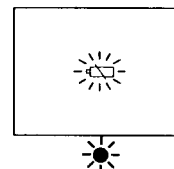
When the battery becomes weak, the  indication and red lamp flash slowly in the viewfinder.

(B-4)

Replace the battery pack with a fully charged one.

The  indication also appears in the display window.

(B-4)



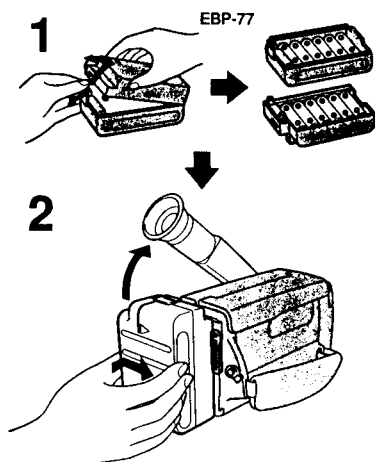
Other options for charging

- AC-V55 AC power adaptor:
You can charge two battery packs simultaneously.
- AC-S10 AC power adaptor:
This adaptor has a discharging function. When you want charging only, slide the skip switch on the adaptor in the direction of the arrow.
- BC-55 or BC-77 portable battery charger:
You can charge a battery pack on 100 — 240 V AC.
- DC-V30 car battery charger:
You can charge a battery pack by connecting the car battery charger to the cigarette lighter socket. This battery charger also supplies power for Sony 8 mm equipment that operates on a battery pack.

If you have an NP-4000 battery pack

You can use it for a long outdoor recording.

(B-5)



Using Alkaline Batteries

(B-5)

The EBP-77 battery case is required (not supplied) to use 12 alkaline batteries.

- 1 Insert the R6 (AA) size alkaline batteries into the battery case.
- 2 Attach the case in the same way as the battery pack.

Battery life (when using Sony alkaline batteries)

The battery lasts for approximately 2 hours and 15 minutes under continuous recording indoors. However, when you use non-Sony alkaline batteries, their life may be shorter.

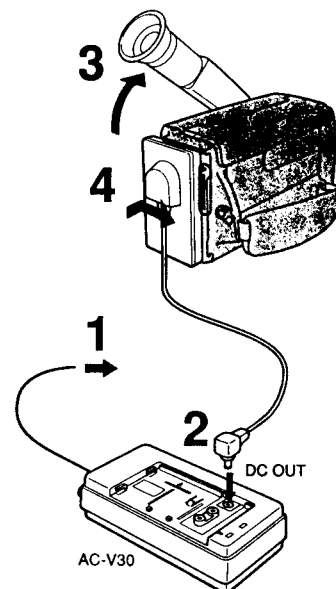
Notes on battery life

- Batteries will not last as long in cold places.
- No indication appears in the viewfinder when the batteries are weak.

To remove the battery case

Remove it the same way you do the battery pack. See page 17.

(B-6)



Using House Current

(B-6)

Use the supplied AC-V30 AC power adaptor.

- 1 Connect the AC power adaptor to a wall outlet.
- 2 Insert the connecting cord supplied with the AC-V30 AC power adaptor into the DC OUT jack on the AC power adaptor.
- 3 Lift up the viewfinder.
- 4 Align the right side of the connecting plate with the white line on the camcorder, and slide it in to the right.

See the instruction manual of the AC power adaptor for details.

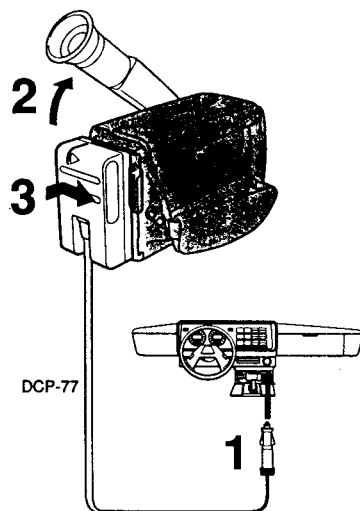
To remove the connecting plate

Remove it the same way you do the battery pack. See page 17.

Other option

You can also use the AC-V55 and AC-S10 AC power adaptor.

(B-7)



Using the Car Battery

(B-7)

The DCP-77 DC pack is required (not supplied) to use the car battery.

- 1 Connect the cord to the cigarette lighter socket of a car (12 V or 24 V).
- 2 Lift up the viewfinder.
- 3 Align the right side of the DC pack with the white line on the camcorder, and slide it in to the right.

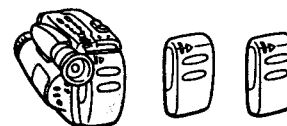
To remove the DC pack

Remove it in the same way as you do with the battery pack. See page 17.

Other options

- You can also use the AC-V55 power adaptor and the DCC-16AE car battery cord to operate this camcorder on a 12 V or 24 V car battery.

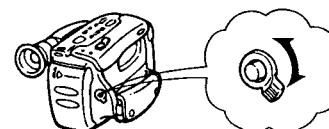
(C-1)



(C-2)



(C-3)



The Best Way to Use the Battery Pack

How to Prepare the Rechargeable Battery Pack

Have sufficient battery pack power to do 2 or 3 times as much recording as you have planned. (C-1)

"Battery life" as indicated in the instruction manual or catalogue of the camcorder is measured by the continuous recording time of the camcorder, placed at a room temperature using a fully-charged battery.

Battery life is shorter in a cold climate. (C-2)

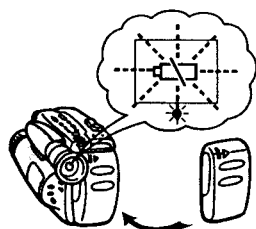
Battery efficiency is decreased and the battery will wear out more quickly.

Turn the STANDBY switch of the camcorder off when not recording to save battery power.

A smooth recording can be made even if recording is stopped and started again. (C-3)

While positioning the subject or selecting an angle, or looking through the viewfinder lens, the lens moves automatically and the battery is used. The battery is also used when a tape is inserted or removed.

(C-4)



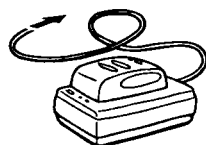
When the Rechargeable Battery Pack should be Replaced

(C-4)

When the  mark in the viewfinder changes from slow flashing to rapid flashing and the battery lamp lights in the viewfinder while you are recording

Turn off the power switch of the camcorder and replace the battery pack. Leave the tape in the camcorder in order to obtain a smooth recording after the battery pack is replaced.

(C-5)



Notes on Charging

Before using the battery pack, charge it sufficiently. A brand-new battery pack is not charged.

Recharge the battery pack only when it is discharged. (C-5)

- If recording is completed before the  mark appears in the viewfinder, we recommend that you remove the tape, set POWER to CAMERA, turn up STANDBY, and leave the camcorder until the  mark flashes rapidly.
- Repeated charging while some capacity remains causes a lowering of battery capacity. However, the original battery capacity can be recovered if you fully charge and discharge the battery again.
- When you use the AC-S10 AC power adaptor, we recommend you to fully discharge the battery first, and then charge it completely.

Recharge the battery pack before using.

If the battery pack is charged fully but not used for a long time (about 1 year), it becomes discharged. Charge it again but in this case, the battery life will be shorter than normal. After several charging and discharging cycles, the battery life will recover its original capacity.

Keep the Terminals Clean

If the terminals (metal parts on the back) are not clean, the battery duration will be shortened.

When the terminals are not clean or when the battery pack has not been used for a long time, install and remove the battery pack from time to time. This will improve the contact. Also, wipe the + and - terminals with a soft cloth or paper.

Notes on the Rechargeable Battery Pack

Why the battery pack heats up

During charging or recording, the battery pack heats up. This means energy has been generated and a chemical change has occurred inside the battery pack. This is not dangerous.

How to care for the battery pack

- Remove the battery pack from the camcorder after using it, and keep it in a cool place.
When the battery pack is attached to the camcorder, a small amount of current flows to the camcorder even if the POWER switch is turned off.
It causes over-discharging and shortens battery life.
- The battery pack is always discharging even when it is not in use after charging. Thus it is recommended you charge the battery before using it.

(C-6)



**How to use the switch on the battery pack
(C-6)**

This switch is provided so that you can remember the charging condition. Set the switch to the "no mark" position when charging is completed. Set the switch to the "red mark" position when the battery is dead.

How many times can the battery pack be recharged

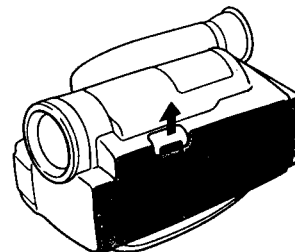
It can be fully charged and discharged about 500 times under normal temperatures. When the  mark flashes rapidly in the viewfinder, even though it is fully charged the battery pack is dead and needs to be replaced with a new fully-charged battery pack.

Temperatures during charging

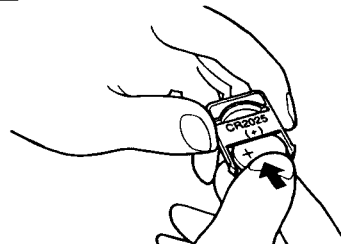
Lower temperatures require a longer charging time. Charging under temperatures ranging from 10°C to 30°C (from 5°F to 85°F) is recommended.

(D-1)

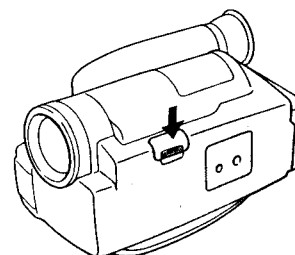
1



2



3



Preparing your camcorder 2

Setting the Date and Time

Inserting the Lithium Battery

(D-1)

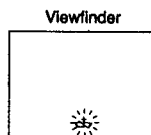
This camcorder uses a lithium battery to activate the clock and to keep a title in memory. Before operating it for the first time, install the supplied lithium battery.

- 1 Pull out the lithium battery holder from the bottom of the camcorder.**
- 2 Install the supplied CR2025 lithium battery with the + side facing the (+) on the battery holder.**
- 3 Put the lithium battery holder back into the camcorder.**

To remove the lithium battery

Remove the lithium battery holder from the camcorder, pull out the lithium battery and insert a new one.

(D-2)



Lithium battery life

The battery lasts for approximately 1 year under normal operation.

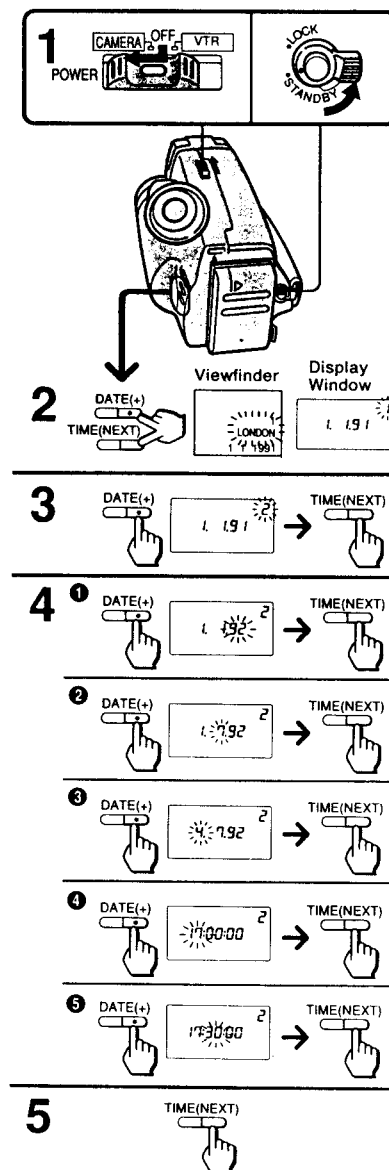
When the lithium battery becomes weak, the  indication will flash on the viewfinder screen for about 5 seconds (when POWER is set to CAMERA). (D-2)

In this case, replace the battery with a Sony CR2025 lithium battery. Use of any other type of battery may present the risk of fire or explosion. While replacing the lithium battery, keep the battery pack or other power source attached. Otherwise, you must readjust the date, time, and title.

CAUTIONS

- Keep the lithium battery out of the reach of children.
Should the battery be swallowed, immediately consult a doctor.
- Wipe the battery with a dry cloth to assure a good contact.
- Be sure to observe the correct polarity when installing the battery.
- Do not hold the battery with the metallic tweezers, otherwise a short-circuit may occur.
- The Battery may explode if mistreated.
Do not recharge, disassemble, or dispose of in fire.

(D-3)



Setting the Date and Time

(D-3)

Make sure that a power source and lithium battery are attached.

- 1 Set POWER to CAMERA, and turn STANDBY up.**
- 2 Press DATE and TIME simultaneously for more than 2 seconds until "1 LONDON" flashes inside the viewfinder.**
DATE now functions as + (to advance numbers) and TIME functions as NEXT (to execute).
- 3 While referring to the illustration and the table on page 54 and 55, press + until your area name and number appear and then press NEXT.**
- 4 Set the year, month, day, hour and minute, in this order.**
First adjust the flashing digits with + and then press NEXT.
- 5 Press NEXT to set the second.**
The clock starts operating.

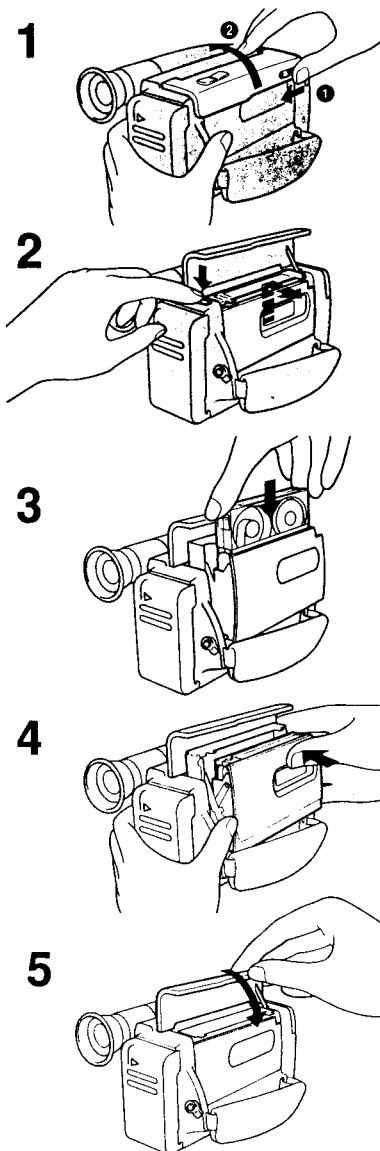
To correct the date and time setting
Press NEXT repeatedly until the minute digits stop flashing. Then repeat step 2 to 5.

To advance the digits faster
Keep + pressed.

To check the preset date and time
Press DATE or TIME. When you press the same button again, the indication goes off.

To set summer time
Press SUMMER TIME. The time changes to summer time, and ☀ indication appears inside the viewfinder and in the display window.
To set to standard time, press SUMMER TIME again.

(E-1)



Preparing your camcorder 3

Inserting a Cassette

Inserting a Cassette

(E-1)

Make sure that a power source is connected.

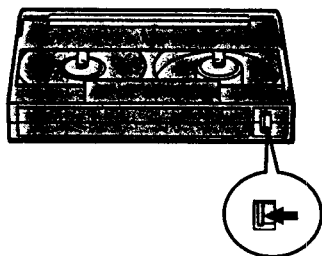
- 1 While sliding the lid lock in the direction of the arrow (1), lift up the lid until it clicks (2).**
- 2 Press EJECT.**
The lid of the cassette compartment will automatically lift up and open.
- 3 Insert a cassette with the window facing out.**
- 4 Press the PUSH mark on the cassette compartment cover to close it.**
- 5 Close the lid.**

Ejecting the Cassette

Make sure that a power source is connected.

- 1 While sliding the lid lock in the direction of the arrow, lift the lid up until it clicks.**
- 2 Press EJECT.**
The lid of the cassette compartment will automatically lift up and open.
- 3 Take out the cassette and press the PUSH mark on the compartment to close it.**
- 4 Close the lid.**

(E-2)



Preventing Accidental Erasure

(E-2)

Slide the tab on the cassette to expose the red mark. This will prevent accidental recording.

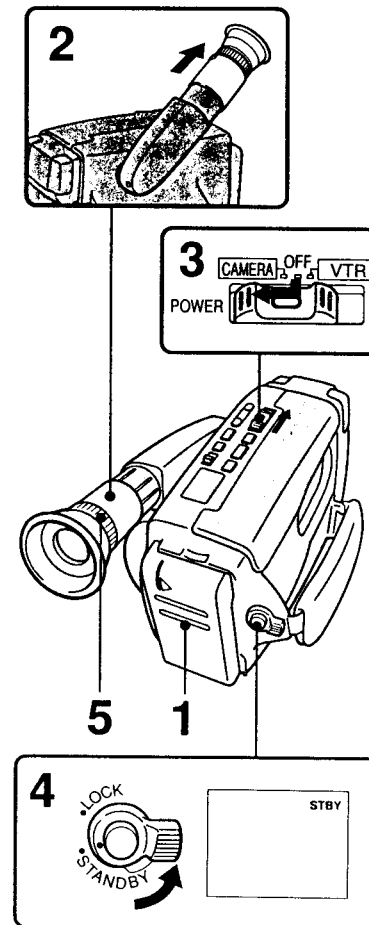
To re-record on this tape, slide the tab back out covering the red mark.

If you try to record with the red mark exposed, the  and  indications flash in the viewfinder.

Notes on handling cassettes

- Never insert anything in the small holes on the rear of the cassette. These holes are used to sense the type of tape, thickness of tape, or if the tab is out or in, etc.
- Store cassettes in their cases and keep them in an upright position to prevent intrusion of dust and uneven winding.
- Store cassettes in their cases and keep them away from heat, humidity, direct sunlight, magnetic fields, dust and mold.

(F)



Preparing your camcorder 4

Adjusting the Viewfinder Lens

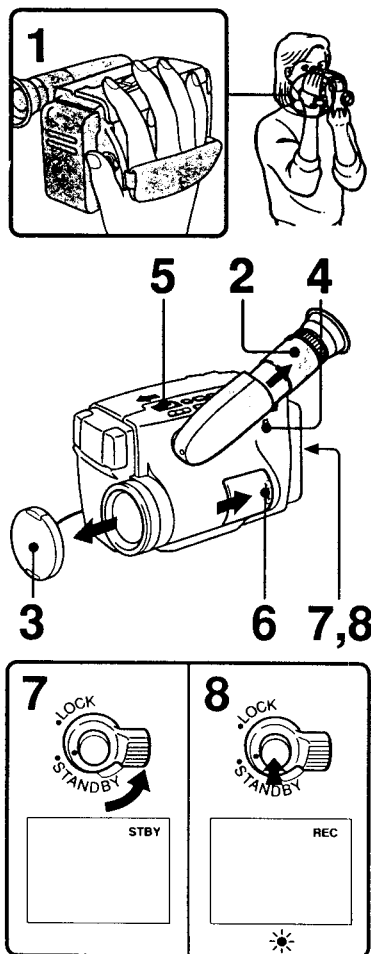
The position of the viewfinder lens for optimum vision varies depending on the person. Adjust it when you use the camcorder for the first time, or when you use it after someone else did.

(F)

- 1 Make sure a power source is connected.
- 2 Pull the viewfinder out until it clicks.
- 3 While pressing the green button, set POWER to CAMERA.
- 4 Turn STANDBY up.
- 5 Turn the viewfinder lens adjustment ring so that "STBY" displayed in the viewfinder screen comes into sharp focus.

Recording a Picture Using Automatic Adjustments

(G-1)



Before recording "once-only" events, we strongly recommend you make a trial recording and check that everything is working properly.

(G-1)

Start Recording

- 1 Hold the camcorder as illustrated.**
Put your hand through the grip strap and check that your thumb can easily touch START/STOP
- 2 Make sure that the viewfinder is pulled out.**
- 3 Remove the lens cap and clip it on the grip strap.**
- 4 Set the Recording mode/EDIT switch to LP (long play) or SP (standard play), according to the length of your planned recorded.**
- 5 While pressing the green button, set the POWER to CAMERA.**
- 6 Make sure that the AUTO LOCK cover is closed.**
- 7 Turn STANDBY up.**
"STBY" appears in the viewfinder. The camcorder is now in the standby mode, and focus is adjusted automatically.
- 8 Press START/STOP.**
"REC" appears and the red lamp lights up in the viewfinder. The camcorder is now recording.

To standby (to stop momentarily)

Press START/STOP again.
"STBY" appears in the viewfinder. The camcorder is in standby mode again.

To stop

Turn STANDBY down and set POWER to OFF.

To set the AUTO/OFF switch

See pages 7 and 73.

Using the supplied Remote Commander

You can record yourself with your friends or family.

How to fit the grip strap (G-2)

Looking at step 1 on the previous page, hold the camcorder against your body and pull the grip strap upward.

For low-position recording (G-3)

The viewfinder can be turned 90 degrees upward.
It can be used in either the pushed-down or pulled-out position.

- 1 Turn STANDBY up.
- 2 Press REC START/STOP with your left thumb.

Note on recording

To record from the beginning of the tape, run the tape for about 15 seconds before recording. This will avoid missing the starting point when the tape is played back.

Note on the standby mode

If you leave the camcorder in the standby mode for 5 minutes or more, the camcorder will turn off automatically. To resume the standby mode, turn STANDBY down once and slide it up again. To start recording, press START/STOP directly.

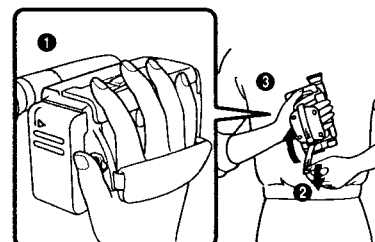
Recording mode

You can record and play back a picture on a tape in both SP (standard play) and LP (long play) modes.
However, the quality of the playback picture in the LP will not be as good as that in the SP mode.

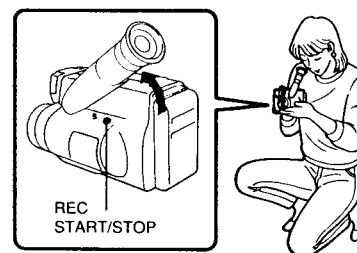
Note on PCM recording and playback

PCM recording or playback is not possible with this camcorder. The PCM sound recorded or after-recorded with another video recorder cannot be played back with this camcorder.

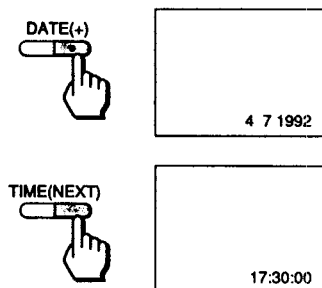
(G-2)



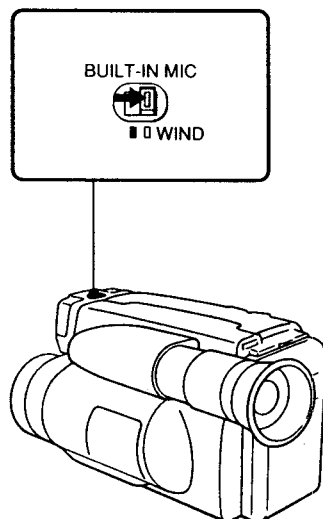
(G-3)



(G-4)



(G-5)



To Record Date and Time

(G-4)

During camera recording or when in recording pause mode, press DATE for date indication or TIME for time indication. The date or time displayed in the viewfinder is recorded with the picture.

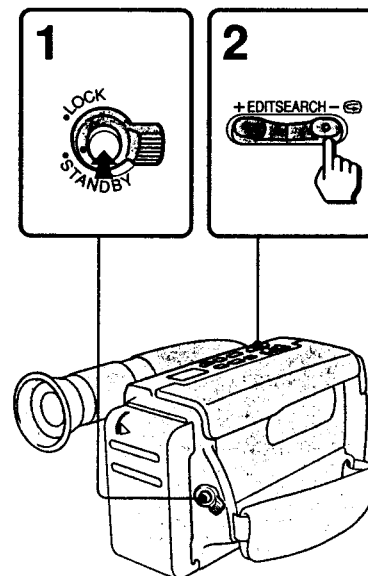
To stop recording date and time
Press DATE or TIME again. The picture recording continues.

When There is a Strong Wind

(G-5)

Set BUILT-IN MIC to "WIND."
The noise from the wind will be reduced. The (wind) indication appears inside the viewfinder.
After recording, set it to the green position (green mark).
If you forget to do this, sound may be recorded unnaturally because of this function.

(G-6)



To Check the Last Portion of the Previous Recording

(G-6)

1 Set the camcorder in the recording pause mode by pressing START/STOP.

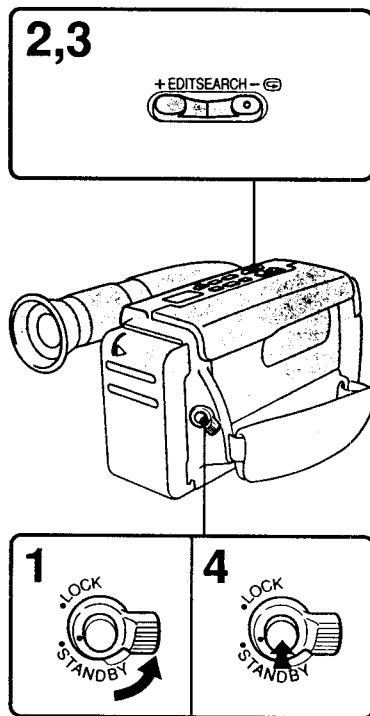
2 Press - side of EDITSEARCH () momentarily.

The last few seconds of the recorded portion are rewound and then the recorded picture appears inside the viewfinder. After a few seconds of playback, the camcorder goes back to recording pause mode.

If the picture has not recorded

The video heads may be contaminated. Clean the heads using the Sony V8-25CLH video head cleaning cassette or equivalent.

(G-7)



To Re-record over a Previously Recorded Portion during Recording

(G-7)

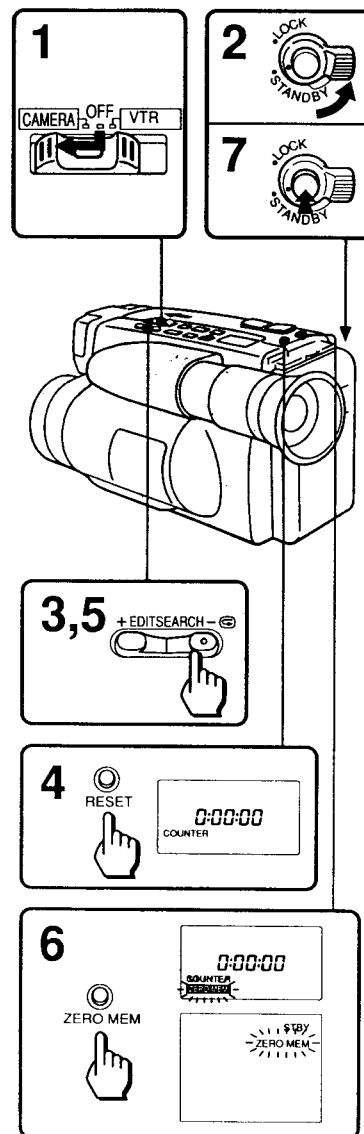
- 1 Turn **STANDBY** up to set the camcorder to the standby mode.
- 2 Look in the viewfinder and find the point from where you want to begin the recording:
Keep pressing the + side of **EDITSEARCH** to advance the picture at a normal playback speed, or the - side to reverse the picture at a normal playback speed.
- 3 At the desired point, release **EDITSEARCH**.
- 4 Press **START/STOP** to start recording.

To pause
Press **START/STOP** again.

To stop
Turn **STANDBY** down.

Note
A smooth transition between scenes can be made even if **STANDBY** is turned down and up, or even if the power is turned off and on again, provided that the tape is not removed.

(G-8)



To Re-record a Picture in the Middle of a Recorded Tape (Insert Recording)

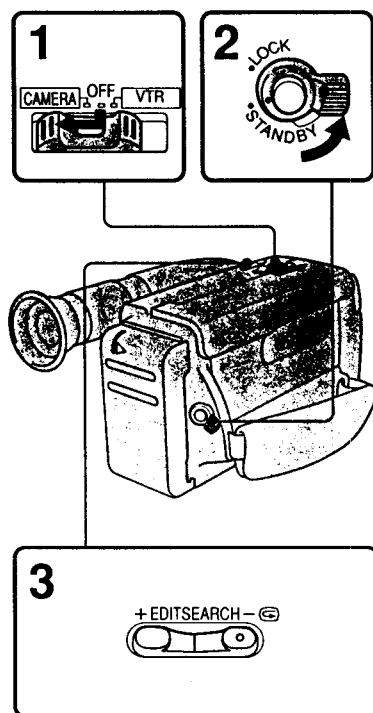
(G-8)

- 1 While pressing the green button, set **POWER** to **CAMERA**.
- 2 Turn **STANDBY** up to set the camcorder to the standby mode.
- 3 While looking in the viewfinder, keep pressing the + or - side of **EDITSEARCH** and release the button where you want to end the insertion. The camcorder is set to standby mode.
- 4 Press **RESET**.
The counter is reset to zero.
- 5 While looking in the viewfinder, keep pressing the - side of **EDITSEARCH** and release the button at the point where you want to start the insertion.
- 6 Press **ZERO MEM**.
The insert ending point is stored in memory.
- 7 Press **START/STOP**.
Insert recording begins.
It stops automatically near the counter zero point.

To cancel ZERO MEM
Press **ZERO MEM**.

Note
The picture may be distorted at the end of the inserted portion when played back.

(G-9)



Playing Back Your Picture Instantly (G-9)

You can check the recorded picture in the viewfinder.

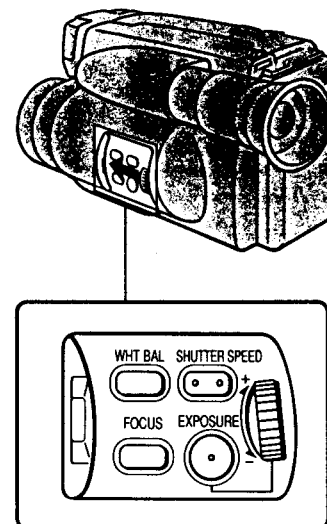
- 1 While pressing the green button, set **POWER** to **CAMERA**.
- 2 Turn **STANDBY** up.
- 3 Keep pressing the **+** or **-** side of **EDITSEARCH** to play back the picture.
+ side: to view the playback picture
- side: to view the playback picture in reverse

To stop playback, release **EDITSEARCH**.

To monitor the sound while viewing the playback picture in the viewfinder
Connect a headphone to the **PHONES** jack.

- 1 While pressing the green button, set **POWER** to **VTR**.
- 2 Press **◀** to rewind the tape and press **□** where you want to stop.
- 3 Press **▶** to start playback.

(H)



Selecting the Automatic/Manual Adjustment

When you close the **AUTO LOCK** cover, the focus, white balance, and exposure adjust automatically, and the shutter speed is set at 1/50. The automatic function offers you worry-free operation under most shooting conditions. But under certain circumstances, manual adjustment is better for effective recording. For manual adjustment, open the **AUTO LOCK** cover and select an appropriate setting.

Even if you open the AUTO LOCK cover:
The setting of each button is the same as the automatic adjustment until you change it.

What Each Button Does (H)

To adjust each item manually, see the page as shown in the table.

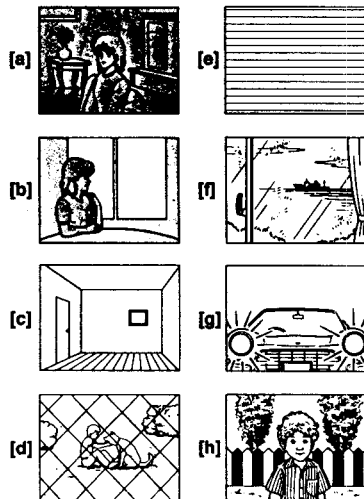
Item	See page
Focus	40
White balance	42
Shutter speed	44
Exposure	46

When you install the battery for the first time
The white balance, focus and exposure automatically adjust and the shutter speed is set at normal speed (1/50) regardless of the position of the **AUTO LOCK** cover.

About the previous settings
As long as you do not remove the battery, even if you set **POWER** to **OFF**, the previous settings are stored.

Manual Focusing

(I-1)



When you close the AUTO LOCK cover and center the subject through the viewfinder, you can easily get an auto-focused picture under most shooting conditions. But we recommend manual focusing in the following cases.

[a] to [h] correspond to the illustrations (I-1).

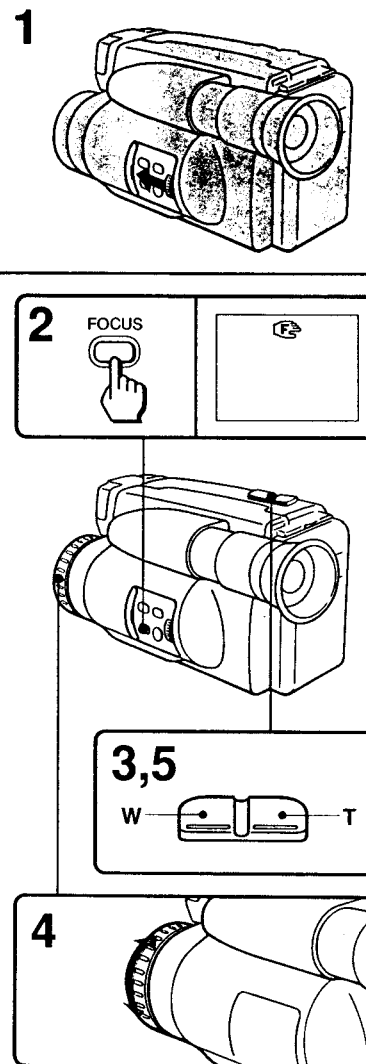
- [a] Insufficient light
- [b] Too much brightness behind the subject
- [c] Subject with little contrast—wall, sky, etc.
- [d] Subjects beyond nets, etc., or another subject passes in front of the camcorder
- [e] Horizontal stripes
- [f] Subject through frosted glass
- [g] Bright subject or subject reflecting light
- [h] High contrast behind the subject (the background may be focused)
- [i] Under the following circumstances
 - When shooting a stationary subject using a tripod
 - To save battery power

Auto-focusing does not function momentarily when:

- The setting of the shutter speed is changed.
- Exposure is adjusted manually.
- Lighting conditions change quickly.
- Zooming is changed from wide-range to telephoto.

This camcorder keeps in focus by referring to the picture contrast, which is weak in the above situations.

(I-2)



Focusing Manually

(I-2)

- 1 Slide open the AUTO LOCK cover.
- 2 Press FOCUS.
The  (manual focusing) indication appears in the viewfinder.
- 3 Keep pressing the T side of the power zoom button until the zooming stops (telephoto).
- 4 Turn the focus ring to achieve sharp focus.
- 5 Set the desired shot length using the power zoom button.

Some helpful hints

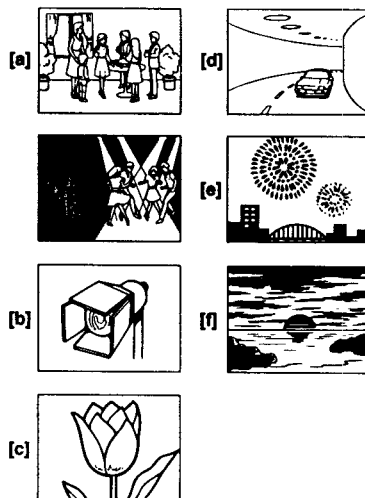
- When shooting in relatively dark places such as indoors, the depth of field in proper focus is very shallow. For best results, shoot at wide angles after focusing in telephoto.
- When shooting a scene with lots of movement in bright light, keep pressing the W side of the power zoom button until the zooming stops (wide angle).

Note

The focus ring does not have a stop position.

Adjusting the White Balance

(J-1)



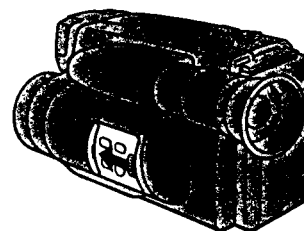
When you close the AUTO LOCK cover, the auto white balance function of this camcorder adjusts the picture to natural colors under most shooting conditions. However, in the conditions listed below, adjust the white balance manually.

[a] to [f] correspond to the illustrations (J-1).

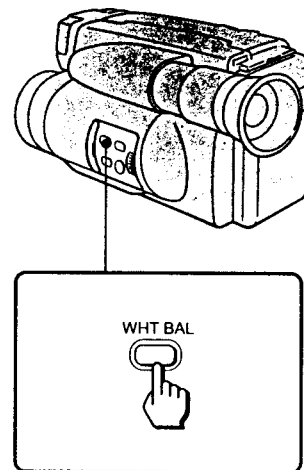
	Conditions	Indication in the viewfinder
[a]	Lighting conditions change quickly	☼
[b]	Too bright, such as in photograph studios	
[c]	Monochromatic subject or background	HOLD
[d]	Under sodium lamp	☼
	Under mercury lamp	
	Under a color matching fluorescent lamp	☼
[e]	Recording outdoors: a night view, neon signs or fireworks	
[f]	Recording outdoors: scenes after sunset or before sunrise	

(J-2)

1



2



Adjusting the White Balance Manually

(J-2)

- 1 Slide open the AUTO LOCK cover.
- 2 Select the desired white balance mode by pressing WHT BAL.

Each time you press the button, the indication changes as follows:

No indication → HOLD → ☼ → ☼
(auto) (outdoors) (indoors)

Note on manual adjustment

When moving from indoors to outdoors or vice versa, close the AUTO LOCK cover and open it again.

What is the HOLD mode?

In HOLD mode, the camcorder adjusts to the color temperature of the subject's light source automatically and keeps that temperature during recording. When recording some subjects with different color temperature, you can achieve a recording with natural colors without being affected by the surroundings.

To set into the HOLD mode

- 1 Close the AUTO LOCK cover.
The camcorder enters automatic white balance mode.
- 2 Point at and record a white, flat object such as a white wall or paper.
- 3 Open the AUTO LOCK cover and press WHT BAL to display the HOLD mark in the viewfinder.
When you change the battery pack or the light source is changed, follow the above procedures again.

Setting the Shutter Speed

(K-1)



(K-1)

When you record a fast-moving subject, increase the shutter speed so that you can see a clear picture in playback pause mode. The depth of field in proper focus becomes shallow at a higher shutter speed. This is effective to record the main subject in sharp focus and the surroundings out of focus.

Note

When recording at a high-speed shutter setting, record in a brighter place than usual.

Recommended setting for your situation

Choose an appropriate shutter speed according to the situation, referring to the following chart.

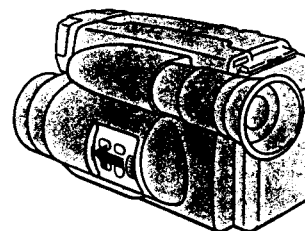
Example use	Recommended shutter speed
- On clear days, recording a golf or tennis swing (To view the hit ball clearly in the still picture mode, set to 1/4000 or 1/10000) - Recording skiers	1/10000 or 1/4000 or 1/2000
- On overcast days, recording a moving merry-go-round or roller-coaster - Recording outdoors from inside a vehicle (for stable shooting)	1/1000 or 1/250
- Instead of the ND2 filter (To reduce the exposure level to about a half) - Recording indoor sports (for stable shooting)	1/120

When playing back a picture recorded at certain speeds

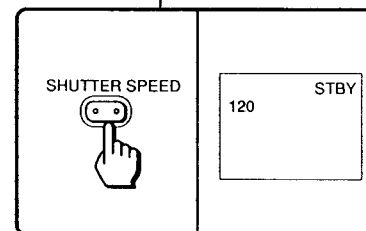
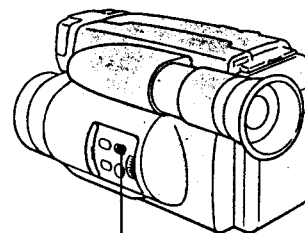
Use 8 mm video equipment with a clean still function to obtain a noiseless still picture.

(K-2)

1



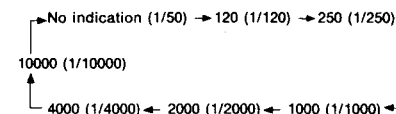
2



Selecting the Shutter Speed

(K-2)

- Slide open the AUTO LOCK cover.
- Press SHUTTER SPEED repeatedly until the desired shutter speed indication appears. Each time you press the button, the indication changes as follows:



Notes

- When you shoot a very bright subject at a faster shutter speed, a vertical light, belt-like line (smear) may appear on the screen.
- When you record at certain shutter speeds under a light discharge tube, such as a fluorescent lamp, sodium lamp, or mercury lamp, the brightness of the recorded picture may vary (causing the picture to flicker).

Adjusting the Exposure

When you close the AUTO LOCK cover, the exposure is automatically controlled in this camcorder. However, in the conditions listed below, adjust the exposure manually.

[a] to [d] correspond to the photographs (L-1).

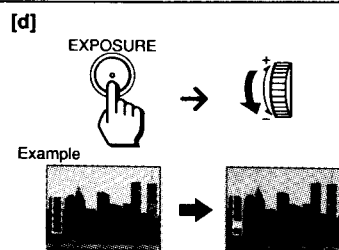
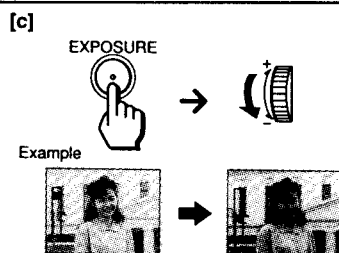
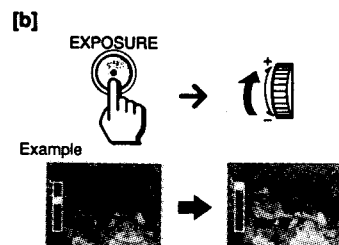
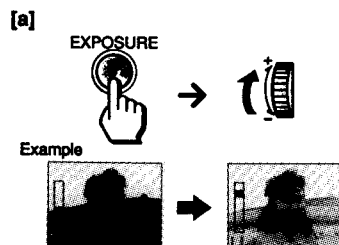
[a] The background is too bright (backlighting).

[b] Insufficient light: most of the picture is dark.

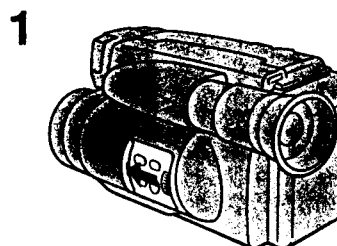
[c] Bright subject and dark background

[d] To record the darkness faithfully

(L-1)



(L-2)



Adjusting the Exposure Manually

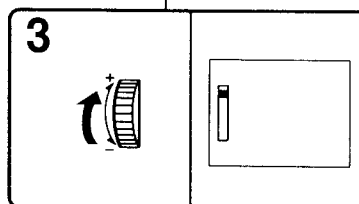
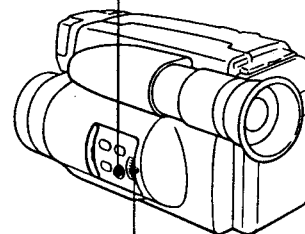
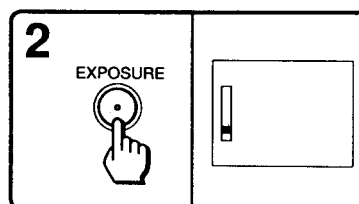
(L-2)

1 Slide open the AUTO LOCK cover.

2 Press EXPOSURE.
The exposure indication appears.

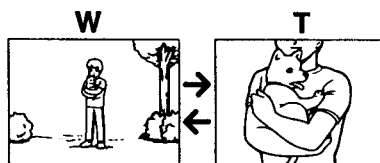
3 Adjust the exposure by using the EXPOSURE dial.

To restore the automatic exposure mode
Press EXPOSURE until the exposure indication in the viewfinder disappears.



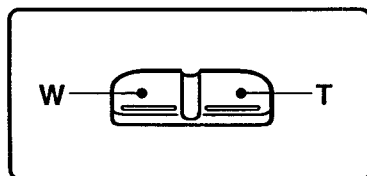
Zooming

(M-1)



The size of the subject in the screen can be changed. Use "zoom-in" for dramatic close-ups. Use "zoom-out" for panoramic long shots. Also use zooming to focus manually or to decide the shooting angle. **(M-1)** You can change the zooming speed. When you press the power zoom button firmly, the zooming speed gets faster, and when you press it softly, the speed gets slower.

(M-2)



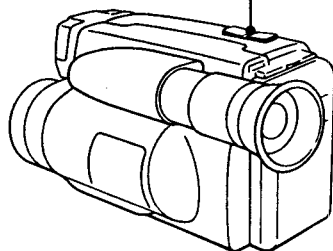
Power Zooming

— For smooth and constant zooming (M-2)

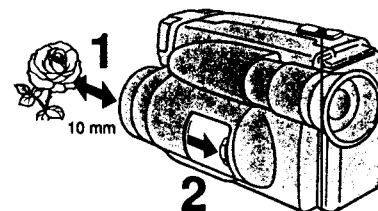
Press the T side of the power zoom button for telephoto (subject appears closer) and the W side for wide-angle (subject appears farther away).

For more zooming effect

When you use VCL-0637A, VCL-1437A or VCL-TRA (a 37 mm conversion lens/not supplied), you can get more telephoto focus or wider angle.



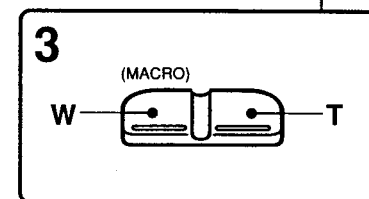
(N-1)



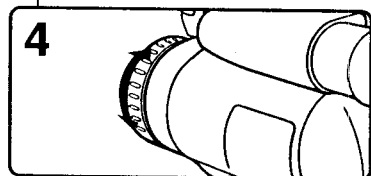
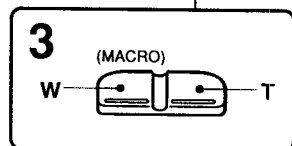
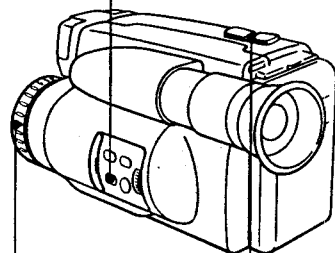
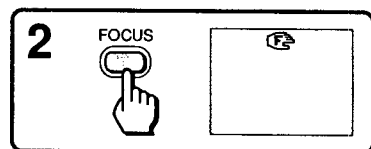
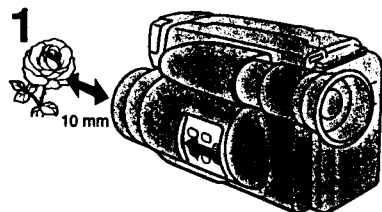
Close-Up (Autofocusing in Macro)

Even small subjects, such as flowers, insects, and images in photographs, can literally fill the screen using autofocusing in macro. **(N-1)**

- 1 Bring the camcorder as close as necessary to obtain the desired subject size.**
The subject can be as close as a minimum of 10 mm (13/32 in.) from the lens surface.
- 2 Close the AUTO LOCK cover.**
- 3 Keep pressing the W (Macro) side of the power zoom button until the zooming stops (wide-angled).**



(N-2)



Manual focusing in Macro (N-2)

- 1 Slide open the AUTO LOCK cover.
- 2 Press FOCUS.
The  (manual focusing) indication appears in the viewfinder.
- 3 Keep pressing the W side of the power zoom button until the zooming stops (wide-angle).
- 4 Turn the focus ring to achieve sharp focus.

Recommended accessory

When shooting in macro, the depth of field is very shallow, so pay attention to focusing. To keep the subject in focus, use a tripod.

Note

Shoot the subject at the wide-angle position in macro. At the telephoto position, if the subject is closer than 1 m (3 ft. 3 3/8 in.), it cannot be brought into focus.

Fade-in and Fade-out

(O-1)

You can fade-in or fade-out to give your recording a professional appearance. When fading-in, the picture will gradually appear from black. The sound will also gradually increase. When fading-out, the picture will gradually fade to black. The sound will also gradually decrease.

To Fade-in

(O-2)

- 1 Turn **STANDBY** up to set the camcorder in the standby mode.
- 2 Press **FADER**.
The "FADER" indication appears in the viewfinder.
- 3 Press **START/STOP**.
The recording starts fading in.

To Fade-out

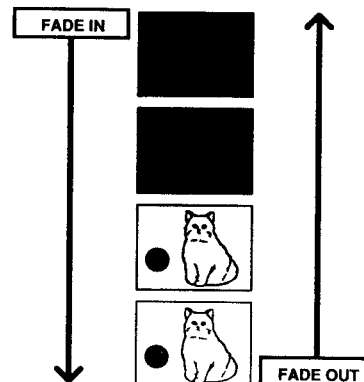
(O-3)

- 1 While recording, press **FADER**.
The "FADER" indication appears in the viewfinder.
- 2 Press **START/STOP** to stop the recording.
Fade-out is performed and then recording stops.

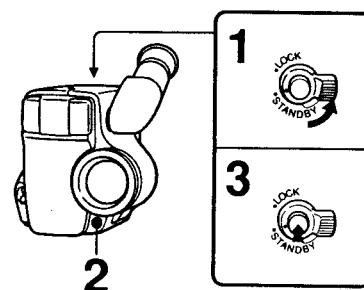
To cancel the fade-in/fade-out function before it is performed
Before pressing **START/STOP**, press **FADER** again.

If you want to use the fade-in/fade-out function repeatedly
Start from step 1 each time.

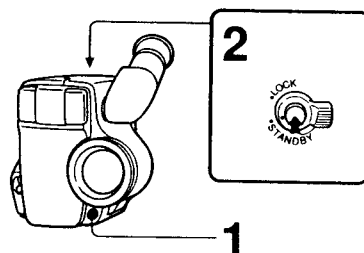
(O-1)



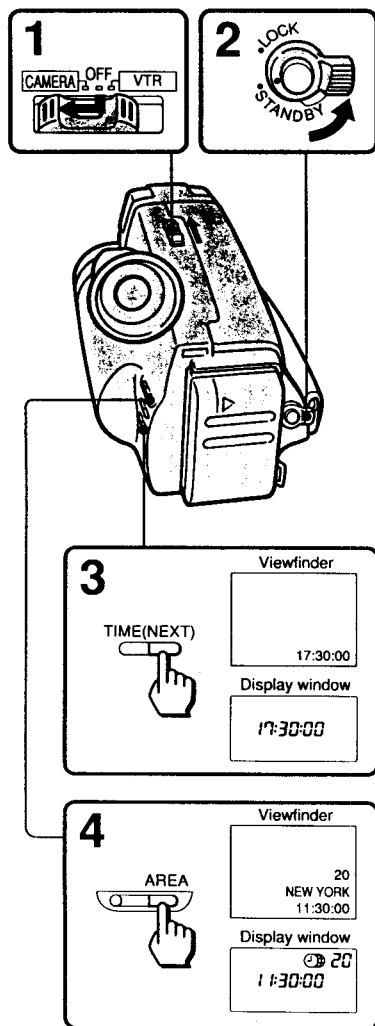
(O-2)



(O-3)



(P-1)



Using the World Clock

This camcorder has a world clock. While traveling abroad, you can easily adjust to the time of the place where you are using the camcorder by pressing AREA. Before pressing AREA, set the date and time in your country (see page 27). (P-1)

- 1 While pressing the green button, set POWER to CAMERA.**
- 2 Turn STANDBY up to set the camcorder in standby mode.**
- 3 Press TIME.**
The time in your country appears.
- 4 Press AREA until the area name and number where you are now using the camcorder appear.**
The time where you are using the camcorder appears. The indication appears in the display window. You can find the area name and number in the "Time zone chart" on page 54.

To check the date

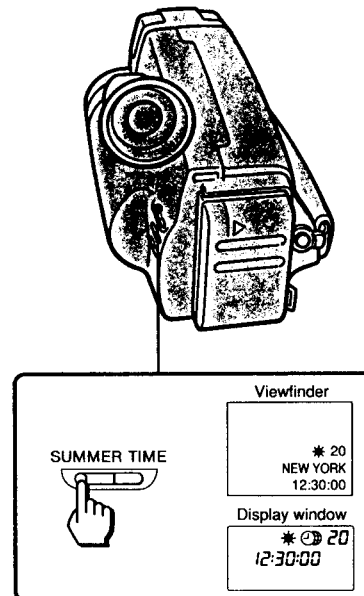
Press DATE.

To turn off the date indication, press DATE again.

To reset to your country area time

Press AREA until your country area and number appears.

(P-2)



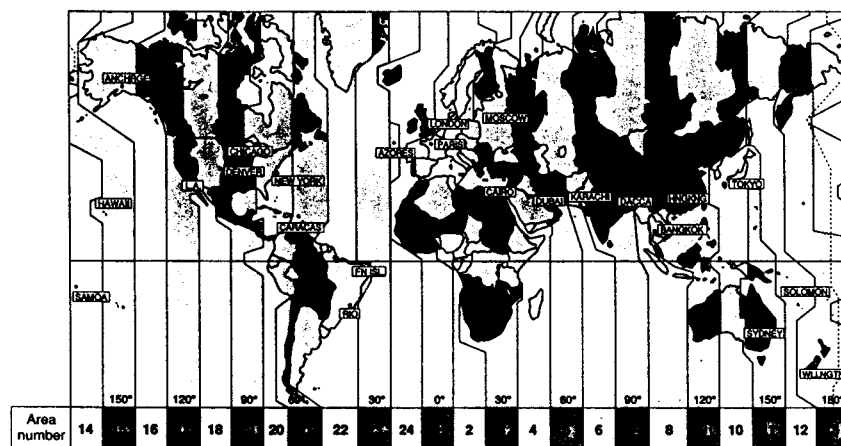
To set summer time

Press SUMMER TIME. Time changes to summer time. Indication appears inside the viewfinder and in the display window.

(P-2)

To set to standard time, press SUMMER TIME again.

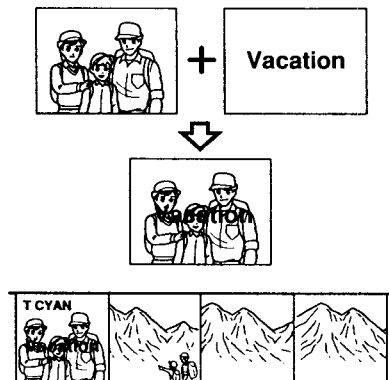
Time Zone Chart



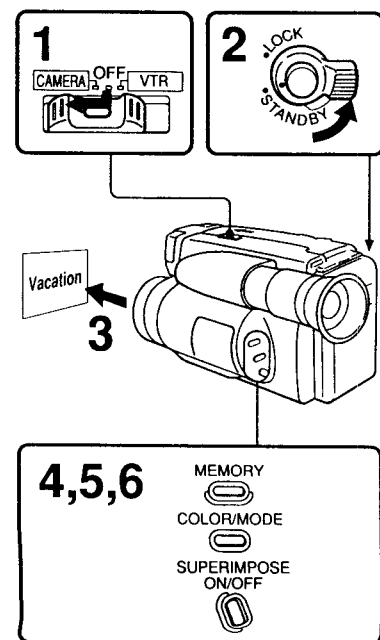
Area number	Area name	Countries or area*
1	LONDON	England, Morocco, Portugal, GMT (Greenwich Mean Time)
2	PARIS	Austria, France, Germany, Italy, Netherlands, Spain, Sweden, Switzerland, CST (Continental Standard Time), Tunisia
3	CAIRO	Egypt, Finland, Greece, Turkey
4	MOSCOW	Ethiopia, Iraq, Kenya, Mauritius, Saudi Arabia, Seychells, U.S.S.R. (Moscow)
5	DUBAI	United Arab Emirates
6	KARACHI	Moldives, Pakistan
7	DACCA	Bangladesh, India, Myanmar
8	BANGKOK	Cambodia, Indonesia (Jakarta), Thailand, Vietnam
9	HNGKNG	Australia (Perth), China, Hong Kong, Indonesia (Bali, Borneo), Malaysia, Philippines, Singapore, Taiwan
10	TOKYO	Japan, Korea
11	SYDNEY	Australia (Sydney)
12	SOLOMON	New Caledonia
13	WLLNGTN	Fiji, New Zealand
14	SAMOA	Western Samoa
15	HAWAII	Hawaii I., Tahiti, HST (Hawaii Standard Time)
16	ANCHRGE	U.S.A. (Alaska), AST (Alaska Standard Time)
17	L.A.	U.S.A. (Los Angeles, San Francisco), PST (Pacific Standard Time)
18	DENVER	U.S.A. (Denver), MST (Mountain Standard Time)
19	CHICAGO	U.S.A. (Chicago), Mexico, CST (Central Standard Time)
20	NEW YORK	Canada (Montreal), Jamaica, Peru, U.S.A. (New York, Washington D.C.), EST (East Standard Time)
21	CARACAS	Chile, Dominica, Venezuela
22	RIO	Argentina, Brazil, Uruguay
23	FN ISL.	Fernando de Noronha
24	AZORES	Azores Islands

* These are common names. The formal names may be different.

(Q-1)



(Q-2)



Superimposing a Title

You can superimpose your own hand-written message or illustration (title) over the picture while you are recording. (Q-1)

- You can store one title.
- You can select the color of the title from 8 colors.
- Before recording, store the title.

Storing a Title

(Q-2)

Before storing

- Make the desired title card.
Use a plain, white card and draw the title in thick, dark letters.
- Make sure the lithium battery is installed (page 25).

How to start

- 1 While pressing the green button, set **POWER** to **CAMERA**.
- 2 Turn **STANDBY** up to set the camcorder in standby mode.
- 3 Point the camcorder to the title card and adjust the focus.
To focus on the subject, use the close-up function.
- 4 Press **MEMORY** to store the title.
- 5 Press **COLOR/MODE** and select the title color.
Each time you press the button, the indication changes as follows.
WHT (white) → BLUE → GRN (green) → CYAN
↑
BLK (black) ← YEL (yellow) ← VIO (violet) ← RED
- 6 Press **SUPERIMPOSE ON/OFF** to turn off the title.

To check the title

Press **SUPERIMPOSE ON/OFF** in the standby mode.

To turn off the title, press the button again.

(Q-3)



(Q-4)



(Q-5)



(Q-6)



About memory back up

The camcorder uses a lithium battery (located on the bottom of the unit) to keep the title in memory. The lithium battery life is approximately 1 year.

Various Display Modes of the Title

You can scroll your title like in the movies, or reverse the title.
Select the display mode of the title from the following table.

Display mode	Indication in the viewfinder
Scrolling up the title (Q-3) The title scrolls up.	↑
Reversing the title with the picture (Q-4)	⏮
Scrolling up the reversed title (Q-5)	⏮↑
Normal display mode	No Indication

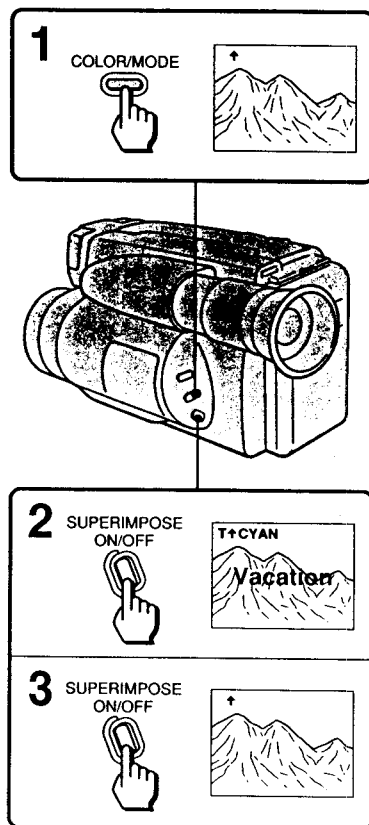
Selecting the display mode

Before displaying the title, press **COLOR/MODE** until the indication of the mode you want appears. (Q-6)

After selecting the mode

Follow the procedure on page 58 to superimpose the title on the picture in that mode.

(Q-7)



Superimposing a Title on Your Tape

The following shows how to superimpose a title using an example in which the title in cyan scrolls up. (Q-7)

- 1 Press COLOR/MODE to select the display mode of the title in the standby mode.**
- 2 Press SUPERIMPOSE ON/OFF at the point from which you want to insert the title during recording.**
You can change the title color by pressing COLOR/MODE. Each time you press the button, the color indication changes.
- 3 Wait for a while and press SUPERIMPOSE ON/OFF again.**
The title goes out.

About the color and the display mode indications

The color and the display mode indications in the viewfinder are not recorded.

(Q-8)

COLOR/MODE



Function of the COLOR/MODE Button

This button has a double function: one is to select the title color and the other is to select the title display mode. Its function depends on whether the title is displayed or not. (Q-8)

To select the color

- 1 Press SUPERIMPOSE ON/OFF to display the title.**
- 2 Press COLOR/MODE.**
Each time you press the button, the color indication changes as follows:

WHT (white) → BLUE → GRN (green) → CYAN
↑
BLK (black) ← YEL (yellow) ← VIO (violet) ← RED

To select the mode

- 1 If the title is displayed inside the viewfinder, press SUPERIMPOSE ON/OFF so that the title disappears.**
- 2 Press COLOR/MODE.**
Each time you press the button, the mode indication changes as follows:

No indication
(Normal title mode) → ↑ → T → T↑

↑ :Title scroll up mode
T :Title reverse mode
T↑ :Title reverse and scroll up mode

Connection for Playback

You must connect the camcorder and the TV and/or VTR properly to view the playback picture.

Check the following connecting examples and go to the appropriate section to make the necessary connections.

Case 1: Connecting the camcorder to a TV with video/audio input jacks.

Case 2: Connecting the camcorder to a TV without video/audio input jacks.

Case 3: Connecting the camcorder to a TV via a VTR.

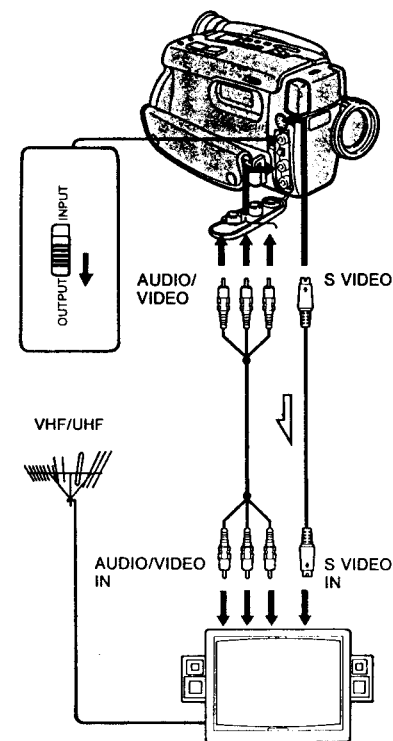
About the AUDIO/VIDEO jacks

The AUDIO/VIDEO jacks on this camcorder works as both input and output jacks.

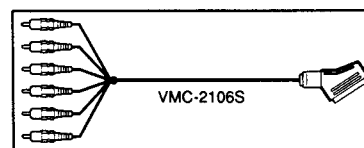
Set the INPUT/OUTPUT selector as follows. (E/AUS MODEL)

in the OUTPUT position	to view the playback tape/ to edit on another VTR
in the INPUT position	to record from another VTR or TV

(R-1)



: Signal flow



Case 1: Connecting to a TV with Video/Audio Input Jacks

(R-1)

Leave the TV aerial cable connected to the TV.

1 Connect the camcorder to the TV using the supplied A/V connecting cable.

- If your TV has an S video input jack, connect the S video jack on the camcorder and the S video input jack on the TV using the S video connecting cable (supplied). In this case, you need not connect the yellow plug of the AV connecting cable.

- If your TV is a monaural type, connect only the white plug for audio both on the camcorder and the TV. Set the HI-FI SOUND switch to the "green position". See "Selecting the Monitor Sound" on page 66.

- If your TV has a 21-pin connector (EUROCONNECTOR), use a connecting cable such as the VMC-2106S (not supplied).

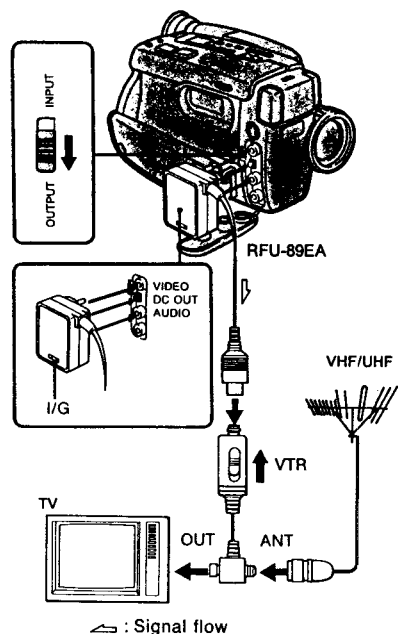
2 Set the INPUT/OUTPUT selector on the Camcorder to OUTPUT. (E/AUS MODEL)

3 Set the TV/VTR selector button or switch on the TV to VTR.

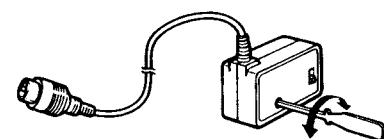
Notes

- For details on the TV, refer to the instruction manual of the TV.
- If your TV is a stereo type, the sound will be in stereo and when your TV is a monaural type, the sound will be in monaural.

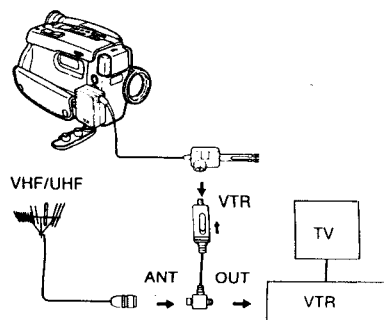
(R-2)



(R-3)



(R-4)



Case 2: Connecting to a TV without Video/Audio Input Jacks

(R-2)

For the customers supplied with the RFU adaptor RFU-89EA

Before you begin

- Use the supplied RFU-89EA RFU adaptor.
- Make sure that the TV is turned off.
- Usually keep the RFU adaptor and the TV connected.

Connecting an RFU adaptor and a TV

- 1 Connect the RFU adaptor to the camcorder.
- 2 Set the INPUT/OUTPUT selector on the camcorder to OUTPUT. (E/AUS MODEL)
- 3 Connect the antenna selector supplied with the RFU adaptor to the VHF/UHF antenna and the TV.
- 4 Set the selector switch on the antenna selector to VTR.

Adjusting the TV

- 1 Set the I/G selector on the RFU adaptor according to the TV system used in your area.
- 2 Turn on the TV and select a program position that is not used to receive a TV station.
- 3 Set the POWER switch of the camcorder to CAMERA and turn STAND BY up.
- 4 Tune the TV so that the picture and the sound from the camcorder is received.

Note

For details on the TV, refer to the instruction manual of the TV.

When the playback picture is not free of disturbance

- 1 Set the selector switch on the antenna selector to ANT.
- 2 Select a program position between UHF channels 30 and 39, so that the TV shows no picture and a steady resting sound or no sound is heard.
- 3 Set the selector switch on the antenna selector to VTR.
- 4 Turn the screw on the RFU adaptor slowly with the supplied screwdriver so that the playback picture is clearly displayed on the TV screen. (R-3)

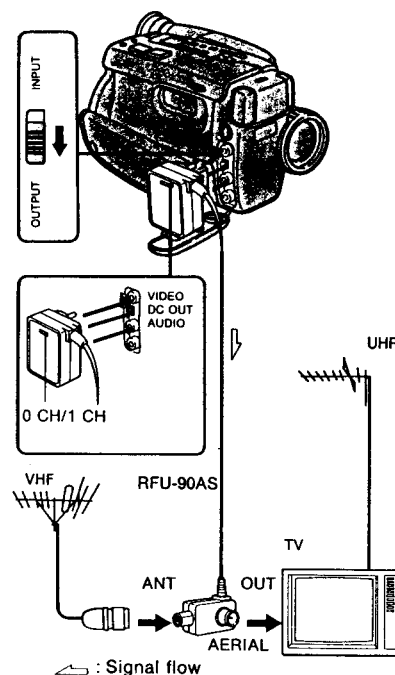
If your TV is connected to a VTR (R-4)

Connect the camcorder to the VTR instead of the TV.

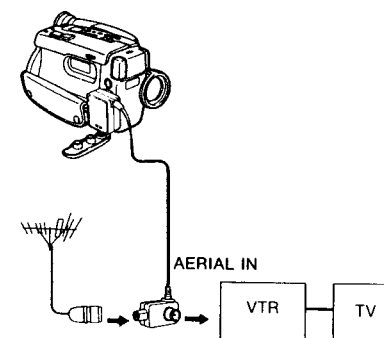
Note

In this connection, the sound will be in monaural.

(R-5)



(R-6)



For the customers supplied with the RFU adaptor RFU-90AS

(R-5)

Before you begin

- Use the supplied RFU-90AS RFU adaptor.
- Make sure that the TV is turned off.
- Usually keep the RFU adaptor and the TV connected.

Connecting an RFU adaptor and a TV

- 1 Connect the RFU adaptor to the camcorder.
- 2 Set the INPUT/OUTPUT selector on the camcorder to OUTPUT. (E/AUS MODEL)

Adjusting the TV

- 1 Select the RF unit selector of the adaptor to 0CH or 1CH, whichever is not active in your area.
- 2 Turn on the TV and select the 0 position so that you can receive the camcorder's playback signal.

If your TV is connected to VTR

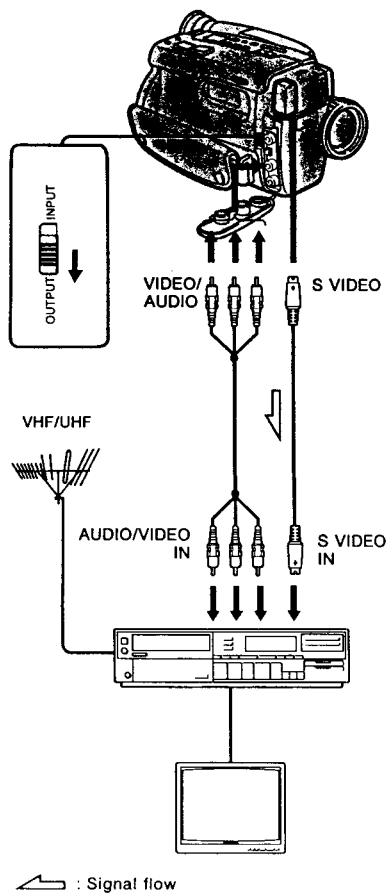
(R-6)

Connect the camcorder to the VTR instead of TV.

Notes

- Whenever playing back a tape, be sure to set the TV to the 0 position.
- In this connection, the sound will be in monaural.
- When you watch a TV program, turn off the camcorder or disconnect the RFU adaptor from the camcorder.

(R-7)



Case 3: Connecting to a TV via a VTR

(R-7)

Leave the VTR aerial cable connected to the VTR.

1 Connect the camcorder to the VTR using the supplied A/V connecting cable.

- If your VTR has an S video input jack, connect the S video jack on the camcorder and the S video input jack on the VTR using the S video connection cable (supplied). In this case, you need not connect the yellow plug of the AV connecting cable.

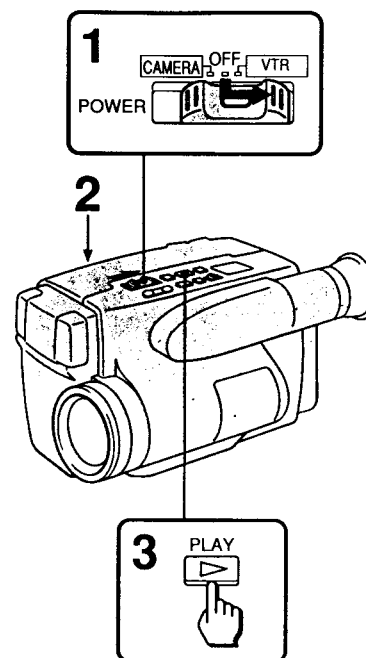
- If your VTR is a monaural type, connect only the white plug for audio both on the camcorder and the VTR. Set the HI-FI SOUND switch to the "green position". See "Selecting the Monitor Sound" on page 66.

2 Set the input selector on the VTR to LINE and set the TV/VTR selector on the TV to VTR.

Note

If your VTR is a stereo type, the sound will be in stereo and when your VTR is a monaural type, the sound will be in monaural.

(S-1)



Playing Back a Tape

Turn on the TV, and select the channel for viewing a playback picture (set the TV/VTR selector to VTR). You can use the supplied Remote Commander.

(S-1)

1 While pressing the green button, set the POWER switch to VTR.

2 Insert a tape.

3 Press ▷.

Playback starts.

To view a still picture, press □ during playback.

To resume playback, press □ or ▷ again.

Note

When the still picture mode lasts for 5 minutes or more, the camcorder automatically enters the stop mode.

To rewind the tape, press ◀.

To advance the tape rapidly, press ▶▶.

To stop the tape, press □.

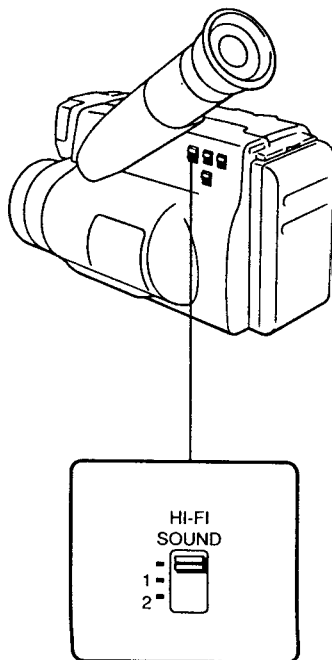
To stop the tape momentarily, press □.

In playback pause mode, you can view the picture in a sequence of stop-motion images by pressing EDITSEARCH. If you keep pressing EDITSEARCH, you can view the picture playback in forward or reverse direction.

Note

Streaks appear and sound is muted in the still picture mode.

(S-2)



Monitoring a High-Speed Picture

To locate a scene (picture search)

Keep pressing ◀ or ▶ during playback. You can monitor the picture at high speed as long as you keep pressing the button.

To resume normal playback, release the button.

To locate a scene quickly (skip scan)

Keep pressing ◀ during rewinding, or ▶ while advancing the tape rapidly. You can monitor the picture at high speed as long as you keep pressing the button.

To resume a normal fast forwarding or rewinding, release the button.

To resume normal playback, press ▷.

Selecting the Monitor Sound

(S-2)

You can select the playback sound with the HI-FI SOUND switch.

When playing back a Hi-Fi stereo sound recorded tape

Set the switch to "Green position."

When playing back an AFM monaural sound recorded tape

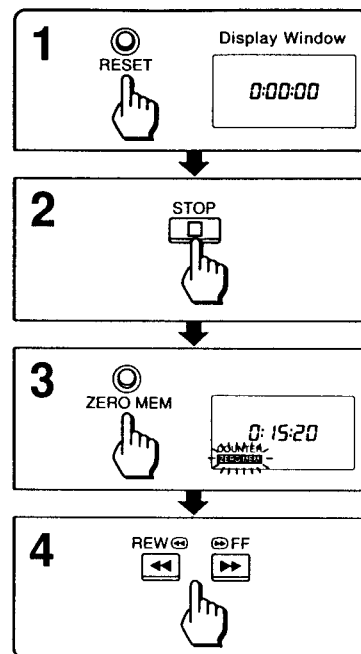
Set the switch to "Green position."

Monaural sound comes from both audio jacks.

When playing back a dual soundtrack tape

Set switch to "1" or "2."

(T)



Using the Tape Counter

During recording or playback, the digits on the counter indicate the actual recording or playing time.

To Index the Whole Tape

(T)

Press RESET at the beginning of the tape so that the counter shows "0:00:00."

Write down the counter reading at a particular point so that you can easily find that point later by referring to the tape counter:

To Return to a Pre-registered Point

1 During playback, press RESET at the point you later want to locate.
The counter shows "0:00:00."

2 Press □ when playback has finished, as usual.

3 Press ZERO MEM.

The "ZERO MEM" indicator flashes in the display window.

Note

Be sure to press the ZERO MEM after you stop the tape. It does not function during recording or playback.

4 Press ◀ or ▶.

The tape rewinds or advances and stops automatically when the counter reaches approximately zero.

Notes on the tape counter and ZERO MEM

- The counter reading and the point on the tape may not correspond exactly. Use the counter as a guide. There will be a time lag of several seconds especially when you repeat fast-forwarding/rewinding and play back a tape recorded in LP and SP modes mixed.
- The ZERO MEM mode is cancelled automatically once the tape is rewound or sent forward to the point you pre-registered.

Editing onto Another VTR

You can create your own video program by editing with any other 8 mm, Hi8 mm, Betamax, VHS, S-VHS, S-VHS, VHS, VHS, S-VHS, S-VHS VTRs that has video/audio inputs.

Before You Begin

- Make connections using the supplied Video/Audio connecting cable. (U)
- If your VTR has an S video input jack, connect the S VIDEO jack on the camcorder and the S video input jack on the VTR using the supplied S VIDEO connecting cable. In this case, you do not have to connect the yellow plug.
- Set the input selector of the VTR to LINE, if available.

Operation

- 1 Insert a tape to be recorded on into the recording VTR.
- 2 Move EDIT on the camcorder in the direction of the arrow. (EDIT ON)
- 3 Make sure that INPUT/OUTPUT is set to OUTPUT. (E/AUS MODEL)
- 4 Set POWER of the camcorder to VTR and insert your recorded tape.
- 5 Playback the tape on the camcorder and locate the point where you want to start editing and set the camcorder to the playback pause mode.
- 6 On the recording VTR, locate the recording start point and set the VTR to the recording pause mode.
- 7 Press [] on the camcorder and on the VTR simultaneously to start editing.

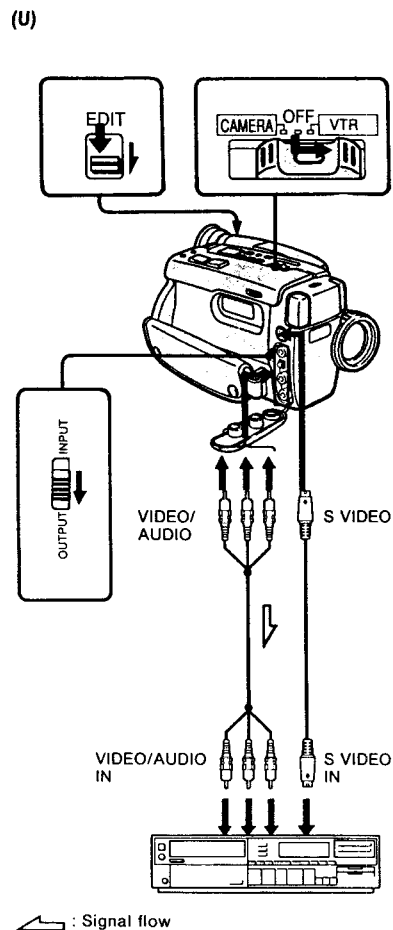
To stop editing momentarily, press [] on the VTR.

To edit more scenes, repeat steps 5 to 7.

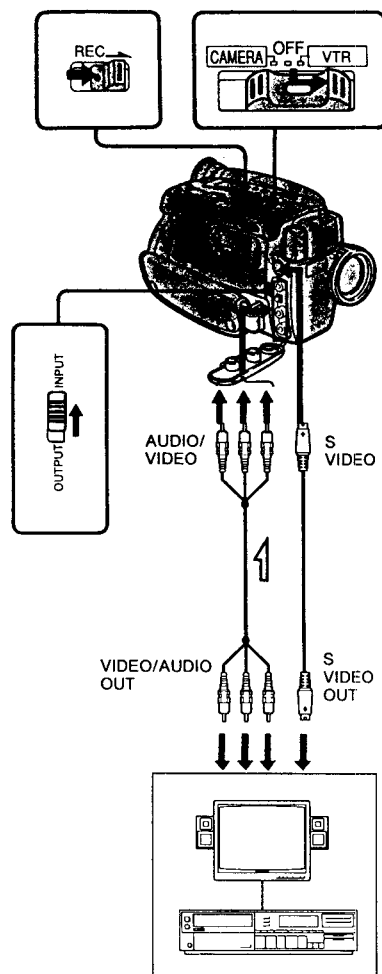
To stop editing, press [] on the camcorder and on the VTR.

Use of the EDIT switch

When you set the EDIT switch in the direction of the arrow (EDIT ON), picture deterioration resulting from editing can be kept to a minimum. Don't use the edited tape for multiple generations of editing. After editing, move the EDIT switch in the opposite direction of the arrow (EDIT OFF).



(V)



 : Signal flow

Recording from Another VTR or a TV

(E/AUS MODEL)

(v) You can record a tape from another VTR, or a TV program from the TV if both are equipped with video/audio outputs.

Before You Begin

- Disconnect the RFU adaptor from the camcorder if it has been connected.
- Make connections using the supplied A/V connecting cable.
- If your TV has an S video output jack, connect the S video jack on the camcorder and the S video output jack on the TV using the S video connecting cable (supplied). In this case, you do not need to connect the yellow (video) plug of the A/V connecting cable.
- If your TV is a monaural type, connect only the white plug for audio both on the camcorder and the TV or the VTR. Do not use the red plug. In this case, the sound will be in monaural.

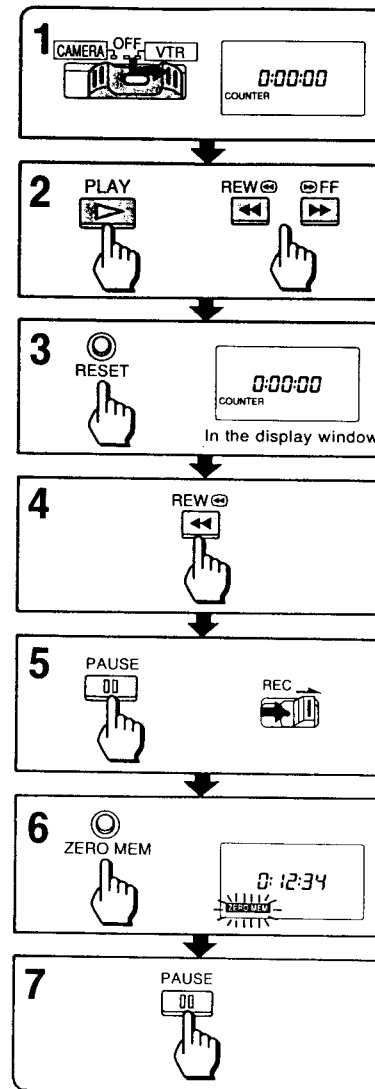
Operation

- 1** Make sure that INPUT/OUTPUT is set to INPUT.
- 2** While pressing the small green button on POWER, slide POWER to VTR.
- 3** Insert a tape in the camcorder.
- 4** Turn on the VTR or TV.
- 5** Play back the tape (in another VTR) or select the TV channel to be recorded.
- 6** Slide ● REC in the direction of the arrow. Recording starts. You can monitor the picture being recorded inside the viewfinder.

Note

You can play back a tape in normal/reverse direction by keep pressing EDITSEARCH during recording standby or playback pause. You can also play back still pictures successively at specific intervals by pressing EDITSEARCH intermittently.

(W)



Insert Editing

(E/AUS MODEL)

(W)
You can insert a new scene from a VTR onto your originally recorded tape by specifying starting and ending points.

Before You Begin

Connections are the same as in "Recording from another VTR or a TV" (page 60). Before you begin replacing recordings, set the VTR to the playback pause mode at the beginning of the scene to be recorded.

Operation

- 1 While pressing the small green button on POWER, slide POWER to VTR.**
The counter appears in the display window.
- 2 Locate the end point where the insert should end by pressing ◀◀ or ▶▶ during playback.**
The viewfinder screen shows a high-speed playback picture.
- 3 At the end point, press RESET.**
The counter resets to "0:00:0."
- 4 Locate the start point where the insert should begin by pressing ◀◀.**
- 5 At the start point, put the camcorder into recording standby mode.**
- 6 Press ZERO MEM.**
The end point of the insert is stored in memory.
- 7 Press [] on both the camcorder and the VTR to start insert editing.**
You can monitor the picture being inserted in the viewfinder screen. The insert recording stops automatically near the zero point on the counter.

To change the end point

Press ZERO MEM so that the ZERO MEM indication disappears, and begin from step 2.

Note

You can play back a tape in normal/reverse direction by keep pressing EDITSEARCH during recording standby or playback pause. You can also play back still pictures successively at specific intervals by pressing EDITSEARCH intermittently.

Compatibility with Conventional 8 mm Camcorders

You can record and play back a high-quality picture on a tape for the Hi8 video system.

Recording with this camcorder

Hi8 tape

- Set  AUTO/OFF to "AUTO". → Tapes are recorded in the Hi8 video system.
- Set  AUTO/OFF to "OFF". → Tapes are recorded in the standard 8 mm video system.

Standard 8 mm tape

- Regardless of the position of the  AUTO/OFF switch. → Tapes are recorded in the standard 8 mm video system.

Playback with this unit

- Tapes are recorded in the Hi8 video system. } The recording mode is selected automatically.
- Tapes are recorded in the standard 8 mm video system.

- A tape recorded in the Hi8 video system cannot be played back with a conventional 8 mm camcorder.
- A standard 8 mm tape  cannot be recorded in the Hi8 video system.
- A tape for the Hi8 video system  cannot be recorded and played back in the Hi8 video system with a conventional camcorder.
- The recording tape speeds in the Hi8 video system are compatible with the conventional 8 mm format. Recording/playback time in the SP mode is 1.5 hours using a E5-90/P5-90 tape or the equivalent.

Cassette used	With this camcorder		
	Recording		Playback
	Hi8	Normal	
Standard 8 mm tape 	No	Yes	Yes
Hi8 tape 	Yes	Yes	Yes

(X-1)



(X-2)



Hints for Better Shooting

Getting Stable Pictures

Assume good posture for shooting (X-1)

- For hand-held shots, it is important to hold the camcorder properly.
- Hold the camcorder firmly and secure it with the grip strap so that you can easily manipulate the camcorder with your thumb.
 - Place your right elbow against your side.
 - Place your left hand under the camcorder to support it. When adjusting the focus manually, make sure the camcorder does not move.
 - Place your eye firmly against the viewfinder eyecup.

Use a tripod

If you have a tripod for a still camera, it can also be used with the camcorder. If a tripod is not available, try placing the camcorder on a table top or any other flat surface of suitable height.

Keep the horizontal plane level (X-2)

The horizontal plane can be easily determined by using the viewfinder frame as a reference.

Planning Ahead

If you are going to edit the tape after recording

Shoot the scene a little longer to make the editing easier.

If you are not going to edit the tape after recording

First record a title and then use the START/STOP button to make a smooth recording.

Lighting

Shoot with the sun behind you

When the light source is behind the subject, or in the following situations, the subject will be recorded too dark and the background too light.

- The subject is indoors and there is a window behind the subject.
- Bright light sources such as fluorescent or incandescent lamps are included in the scene.
- You are shooting a person wearing white or shiny clothes in front of a white background. In this case, the face will be recorded too dark.

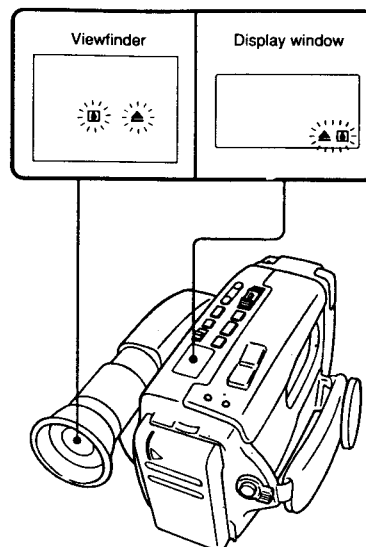
Use video light in the dark

To get the best colors, a sufficient light level must be maintained.

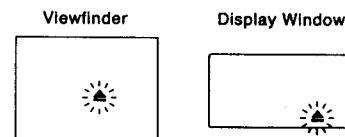
We recommend you use photography lamps or halogen lamps. For best results, use of Sony video lights are recommended because of their weight, low heat output levels.

When using a video light, attach it to this camcorder with a video light attachment (not supplied). For detailed instructions on proper use of light, read the instruction manual of the video light.

(Y-1)



(Y-2)



Notes and Precautions

Notes on Moisture Condensation

If the camcorder is brought directly from a cold place to a warm place, moisture may condense inside the camcorder, on the surface of the tape, or on the lens. In this condition, the tape may stick to the head drum and be damaged or the camcorder may not operate correctly. To prevent possible damage under these circumstances, the camcorder is furnished with a moisture sensor. However, take the following precautions:

If moisture condenses inside the camcorder (Y-1)

When the and indications inside the viewfinder and in the display window flash, moisture has condensed inside the camcorder. In this case, no function except for cassette ejection will work.

Eject the tape, turn off the camcorder, and leave it with the cassette holder open for about 1 hour.

The camcorder can be used again if the indication does not appear when the power is turned on again.

77

If moisture condenses on the surface of the tape (Y-2)

If moisture is present on the surface of the tape when the tape is inserted and a tape transport button (, , etc.) is pressed, the indication flashes inside the viewfinder and in the display window.

In such a case, no function except for tape ejection will work.

Eject the tape and let it sit for about 1 hour.

The tape can be used again if the indication does not appear when the tape is inserted and a tape transport button is pressed.

If moisture condenses on the lens

No indications will appear, but the picture becomes dim.

Turn off the power and leave the camcorder unused for about 1 hour.

(Y-3)



Notes on Video Head Cleaning

(Y-3)

To ensure clear pictures, clean the video heads periodically.

When playback pictures are noisy or hardly visible, the video heads may be contaminated.

[a] Slight contamination

[b] Critical contamination

In such cases,

- 1 Clean the video heads with the Sony V8-25CLH cleaning cassette (not supplied), referring to its instructions.
- 2 After cleaning, check if the picture is clear by recording or playing back with an ordinary tape.
- 3 If the picture is still noisy, repeat cleaning. (Do not repeat cleaning more than 5 times.)

Caution

Do not use a commercially available wet-type cleaning cassette. It may damage the video heads.

Note

If the V8-25CLH cleaning cassette is not available in your area, consult your Sony service facility.

Precautions

On operation

- Operate the camcorder on 6.0 V (battery pack), 7.5 V (AC power adaptor), or 9.0 V (alkaline batteries).
- For DC or AC operation, use the accessories recommended in this manual.
- Should any solid object or liquid fall into the casing, unplug the camcorder and have it checked by qualified personnel before operating it any further.
- Do not hold the camcorder by the viewfinder.
- Avoid rough handling or mechanical shock. Be particularly careful of the lens.
- Keep the lens cap on the lens when not using the camera.
- Do not wrap the camcorder and operate it because heat may build up internally.
- Keep the camcorder away from strong magnetic fields or mechanical vibration.
- **Do not let sand get into the camcorder.**
When you use the camcorder on a sandy beach or in dusty place, protect it from the sand or dust. Sand or dust may cause the unit to malfunction and sometimes the malfunction cannot be repaired.
- **Do not let the camcorder get wet. Keep the camcorder away from rain or sea water. It may cause malfunction and sometimes the malfunction cannot be repaired.**

On care

- When the unit is not to be used for a long time, disconnect the power source and remove the tape. Periodically turn on the power, operate the camera section and player section, and play back a tape for about 3 minutes.
- Clean the lens with a soft brush to remove dust. If there are fingerprints on it, wipe them off with a soft cloth.
- Clean the camcorder body with a dry, soft cloth, or a soft cloth lightly moistened with a mild detergent solution. Do not use any type of solvent which may damage the finish.

Note on copyright

Television programs, films, video tapes, and other materials may be copyrighted. Unauthorized recording of such materials may be contrary to the provision of the copyright laws.

Using Your Camcorder Abroad

Each country has its own electricity system and TV color system. Before using your camcorder abroad, check the following points.

Power Sources

You can use your camcorder in any country with the supplied AC power adaptor within 100 V to 240 V AC, 50/60Hz.

Difference in Color Systems

You can view the playback picture in the viewfinder. However, if you want to view the playback picture on a TV, it must be a PAL system based TV as this is a PAL system based camcorder. (Note that Sony also makes NTSC system based camcorders.) Check the alphabetical list following.

PAL system countries

Australia, Austria, Belgium, China, Denmark, Finland, Germany (former West Germany), Great Britain, Holland, Hong Kong, Italy, Kuwait, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, Thailand, etc.

PAL-M system country

Brazil

PAL-N system countries

Argentina, Paraguay, Uruguay

NTSC system countries

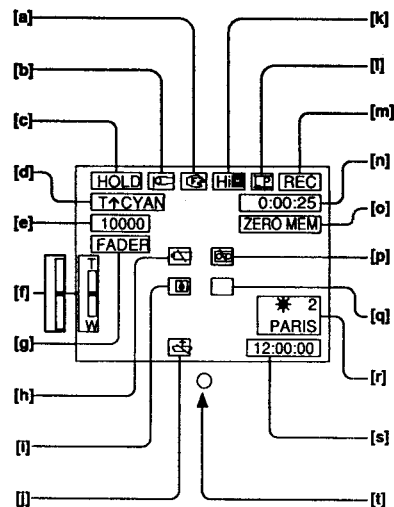
Bahama Islands, Bolivia, Canada, Central America, Chile, Colombia, Ecuador, Jamaica, Japan, Korea, Mexico, Peru, Surinam, Taiwan, The Philippines, U.S.A., Venezuela, etc.

SECAM system countries

Bulgaria, France, Guiana, Hungary, Iran, Iraq, Monaco, Poland, Soviet Union, etc.

Indications in the Viewfinder and the Display Window

(Z-1)



In the Viewfinder

(Z-1)

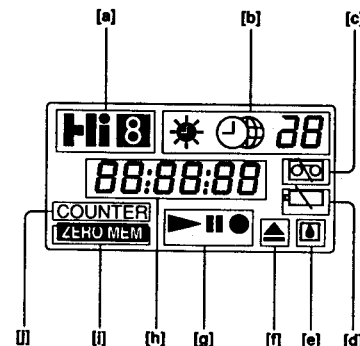
- [a] Manual focusing
- [b] WIND is selected. (W)
- [c] White balance mode (* /△/HOLD)
- [d] Title mode
- [e] Shutter speed
- [f] Power zoom Indicator / Exposure Indication
- [g] FADER is pressed.
- [h] "Replace battery."
- [i] "Moisture has condensed."
- [j] "Replace lithium battery."
- [k] Lights up during recording in Hi8 system.
- [l] Recording/Playback mode (LP/SP)
- [m] Tape transport and camera recording mode
- [n] Tape counter
- [o] ZERO MEM is pressed.
- [p] "Exchange tape or no cassette inside."
- [q] "Clean video heads." or other caution (* , △)
- [r] World clock indication
- [s] Date or time
- [t] Shows up during recording.
When flashing: "Replace battery."

Notes on DEMONSTRATION mode

When you set POWER to CAMERA while pressing [] and [] simultaneously, the "DEMO" indication appears in the viewfinder or on a TV screen if connected and the camcorder automatically demonstrates area names, area numbers, and title modes. You can monitor the sequence inside the viewfinder or on a TV screen if connected.

To turn off the demonstration indication, set POWER to OFF or VTR.

(Z-2)



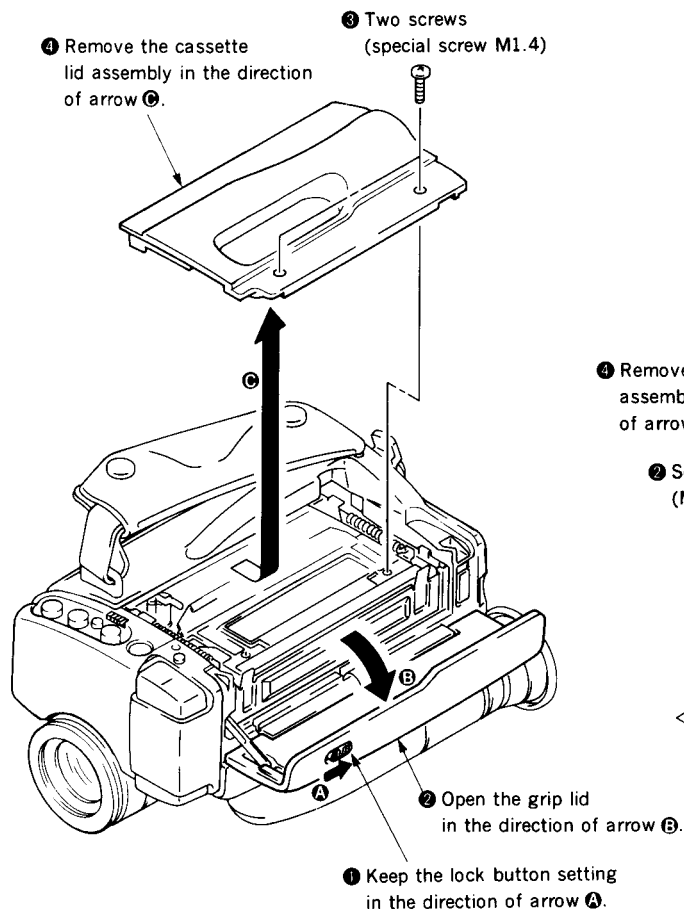
Display Window

(Z-2)

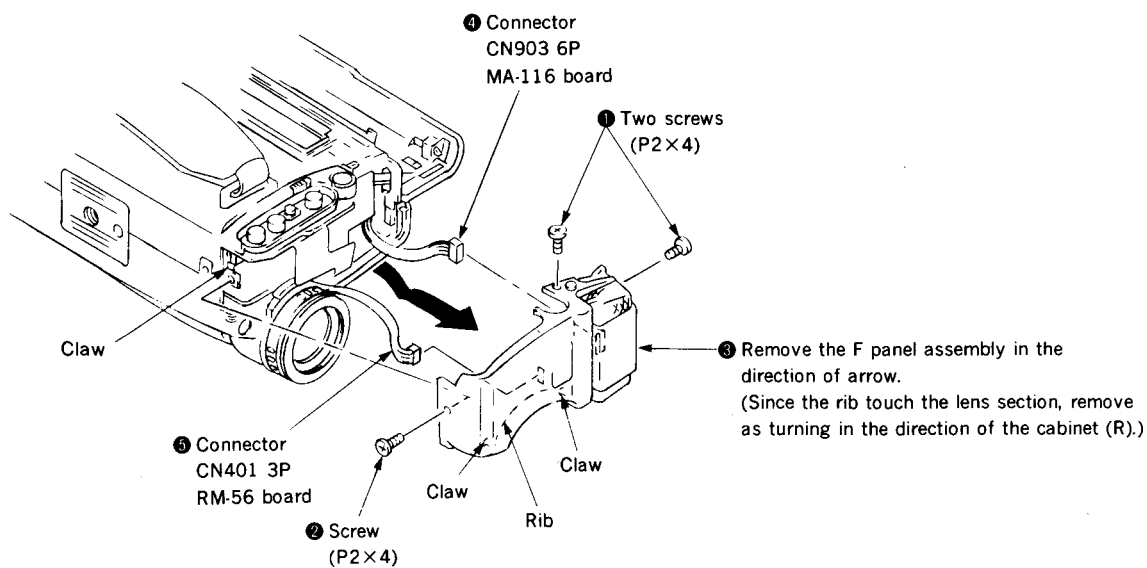
- [a] Playing back or recording with Hi8 system.
- [b] World clock indication
- [c] "Exchange tape or no cassette inside."
- [d] "Exchange battery."
- [e] "Moisture has condensed."
- [f] "Trouble has occurred."
- [g] Tape transport indications
 - ▶ playing back
 - ⏸ pausing
 - recording
- [h] Date, time, or tape counter
- [i] ZERO MEM is pressed.
- [j] Tape counter indication

SECTION 2 DISASSEMBLY

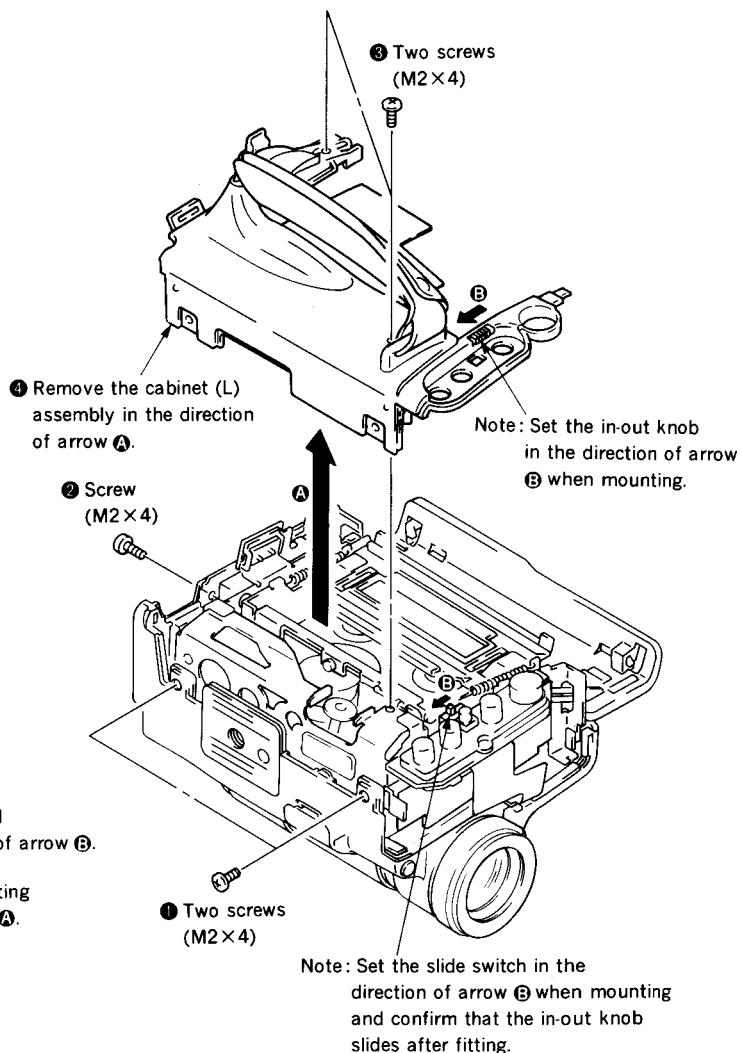
2-1. REMOVAL OF CASSETTE LID ASSEMBLY



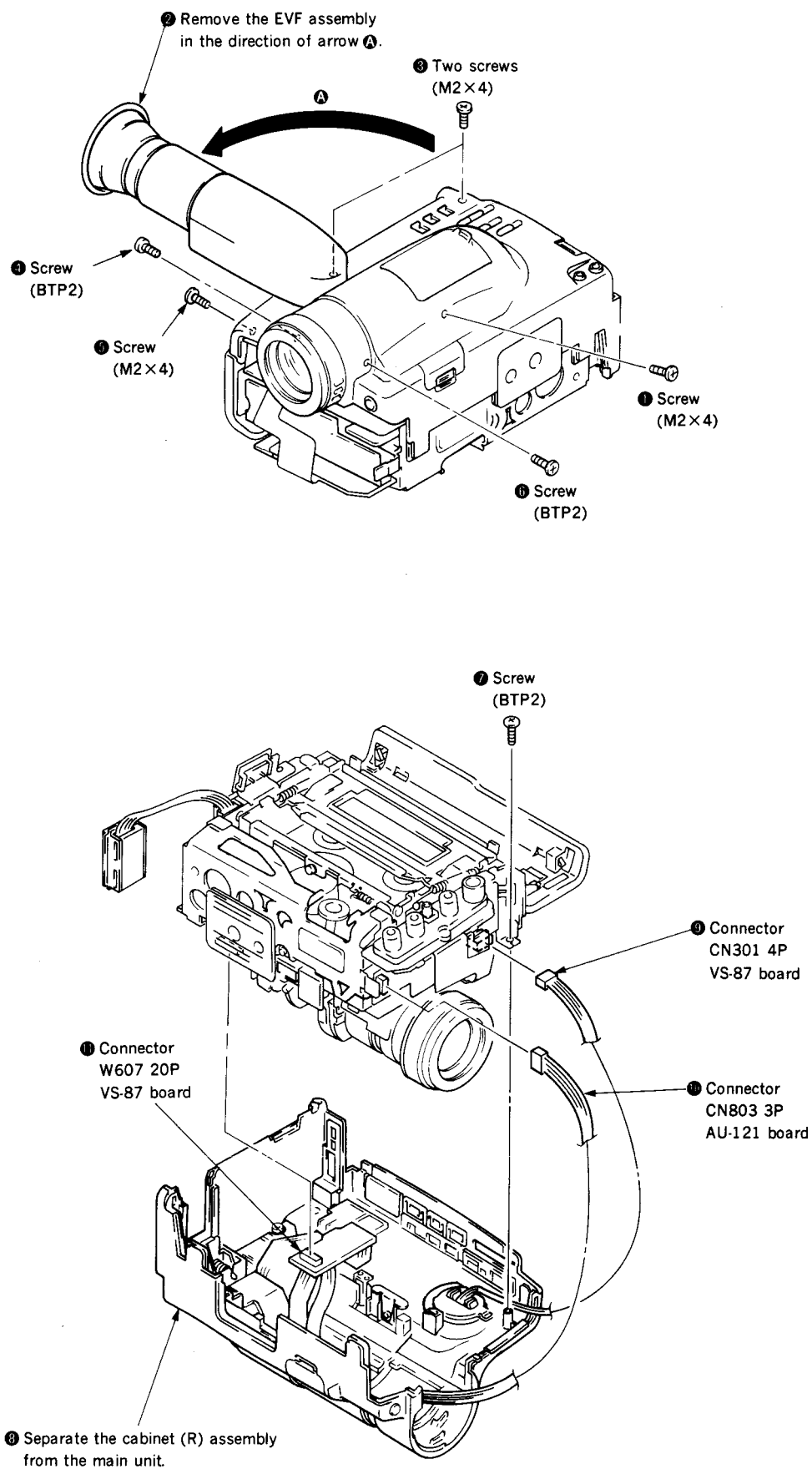
2-2. REMOVAL OF F PANEL ASSEMBLY



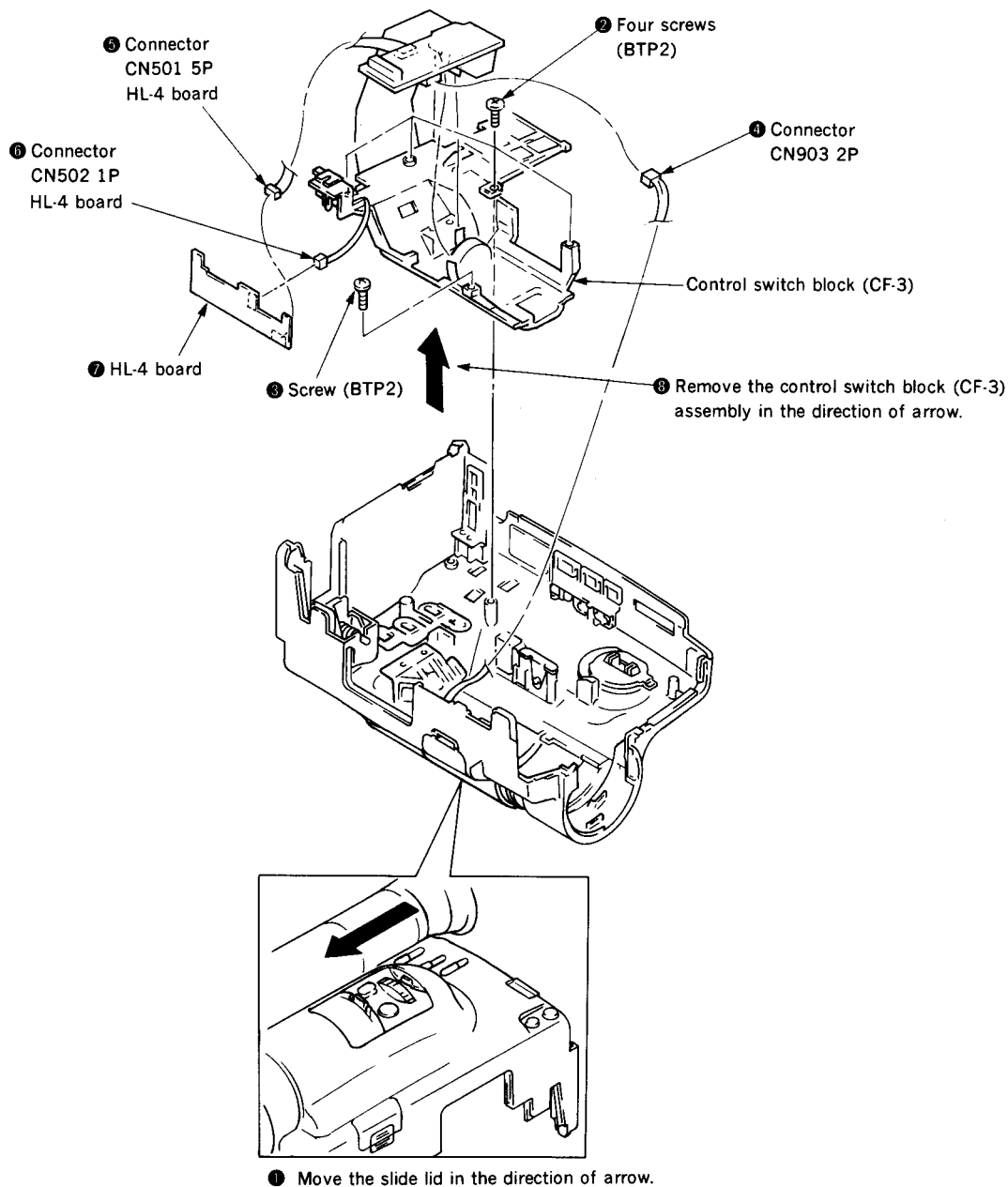
2-3. REMOVAL OF CABINET (L) ASSEMBLY



2-4. REMOVAL OF CABINET (R) ASSEMBLY

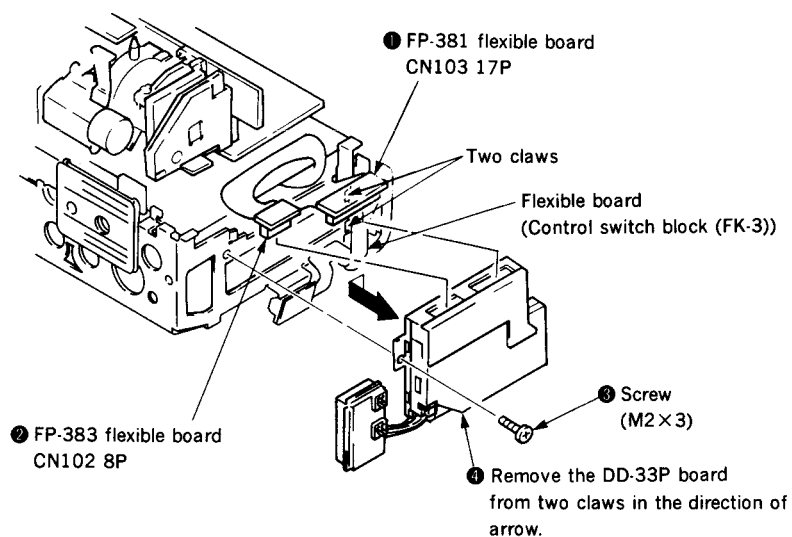


2-5. REMOVAL OF CONTROL SWITCH BLOCK(CF-3)

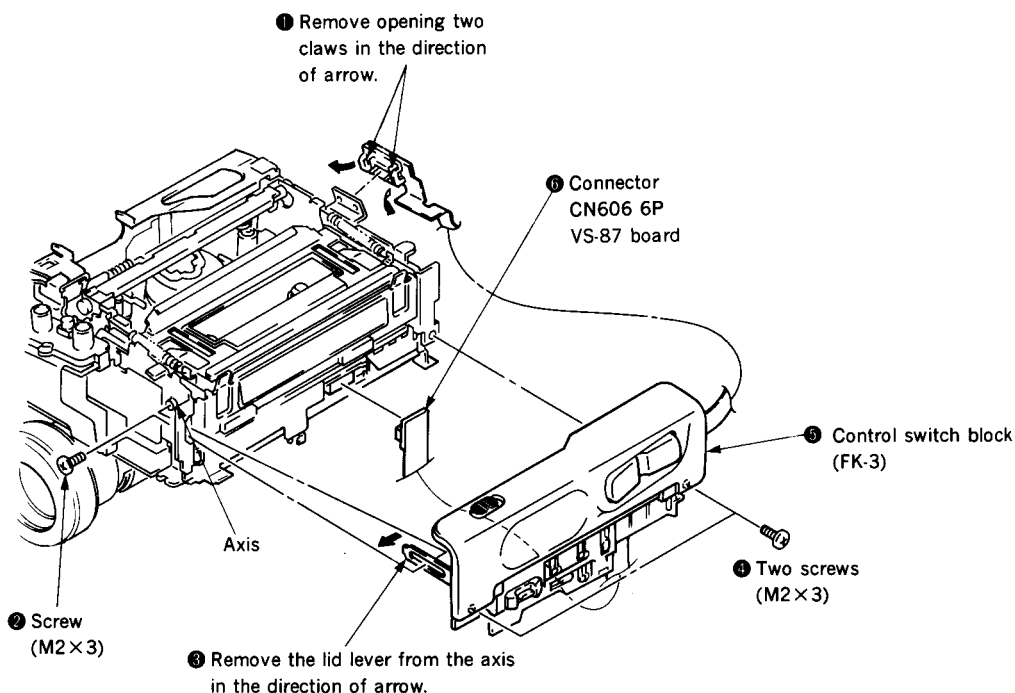


2-6. REMOVAL OF DD-33P BOARD

Note: Take care not to damage the flexible board of the control switch block (FK-3) when removing the DD-33P board.

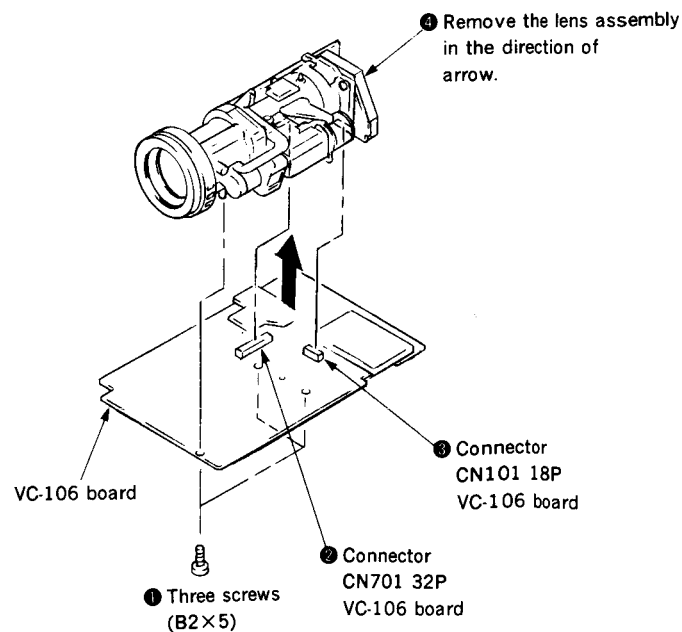
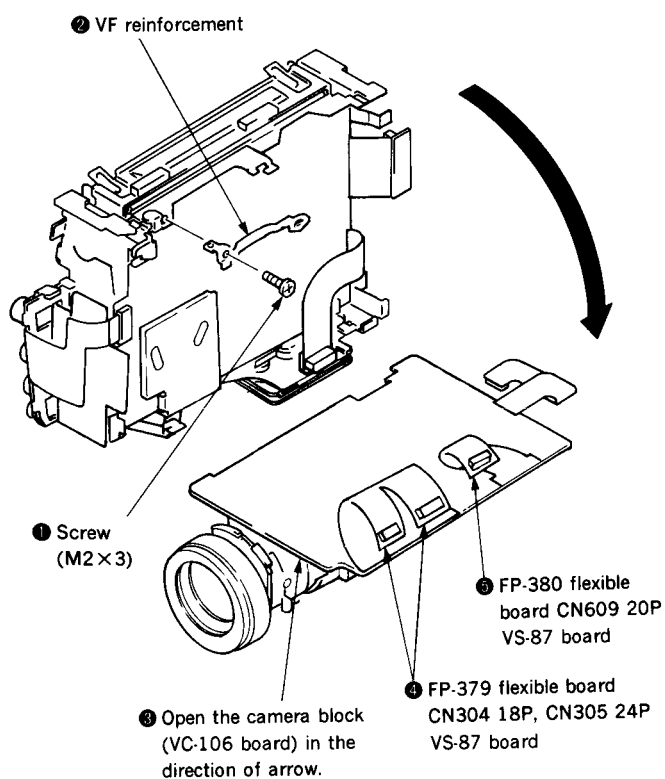


2-7. REMOVAL OF CONTROL SWITCH BLOCK(FK-3)

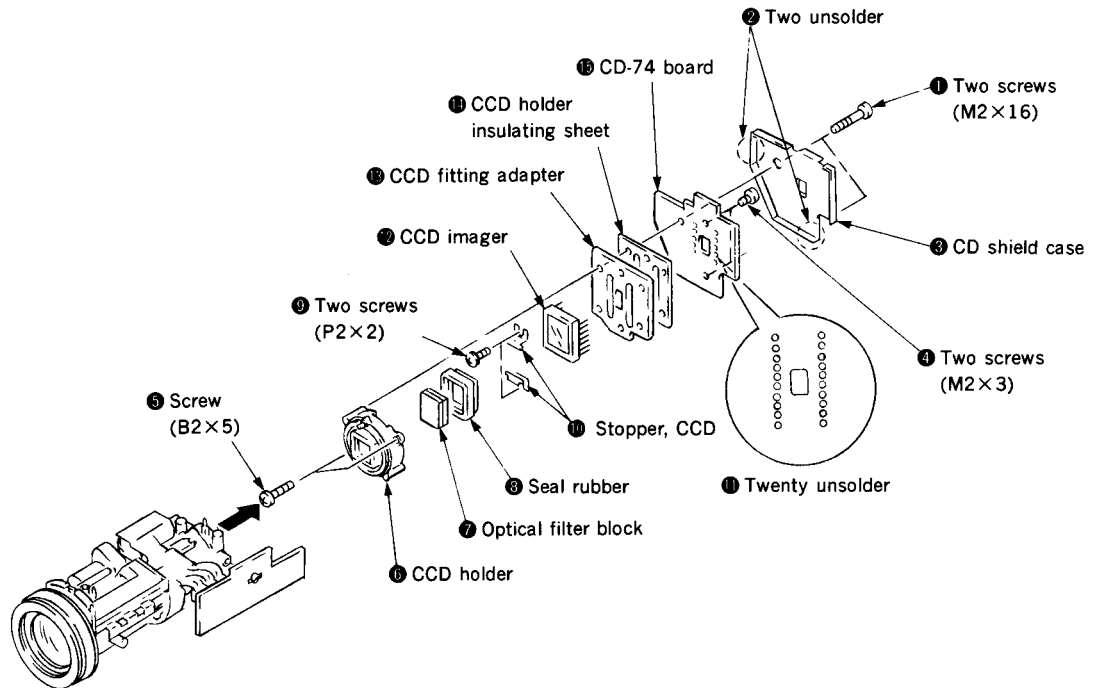


2-8. REMOVAL OF CAMERA BLOCK (VC-106 BOARD)

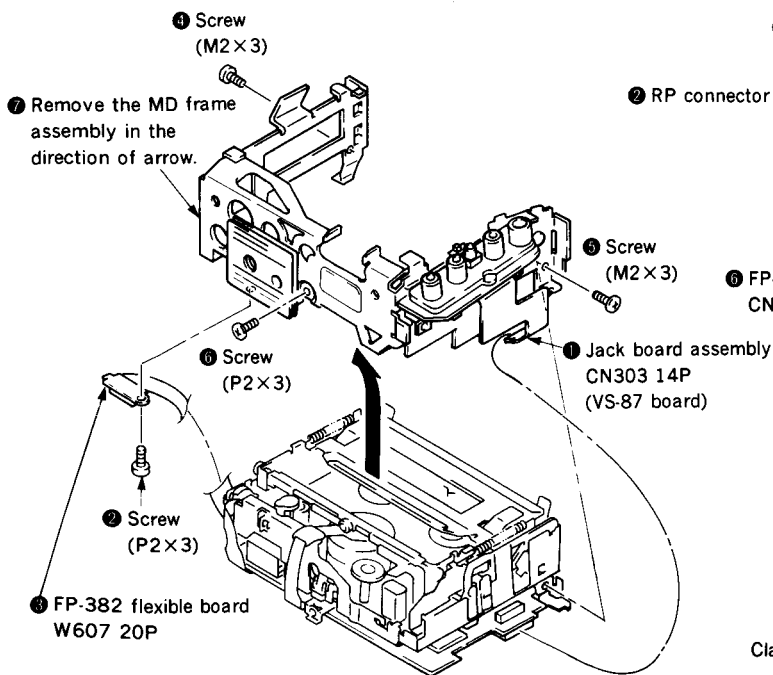
2-9. REMOVAL OF LENS ASSEMBLY



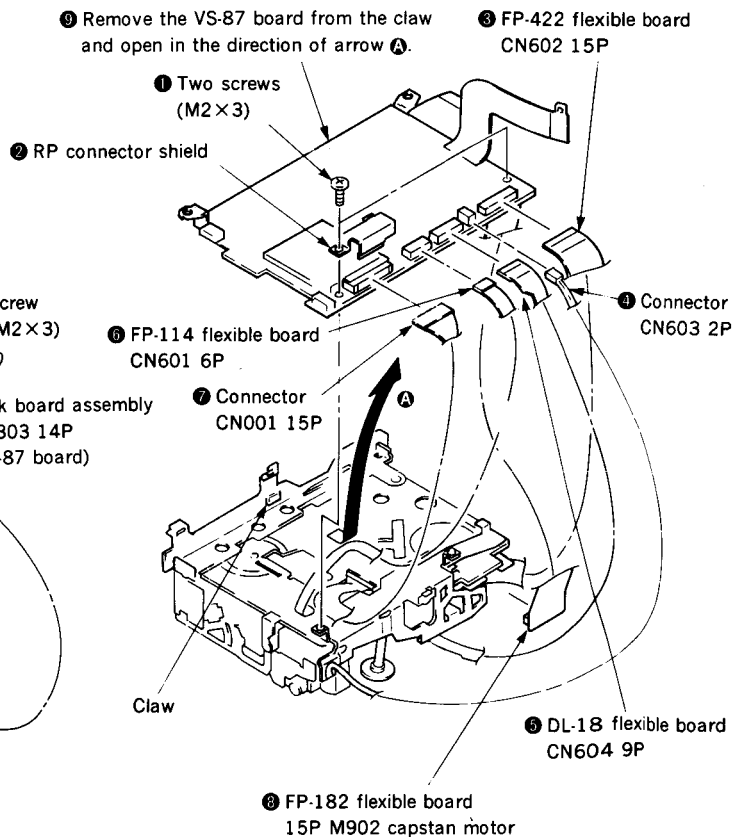
2-10. REMOVAL OF CCD IMAGER (CD-74 BOARD)



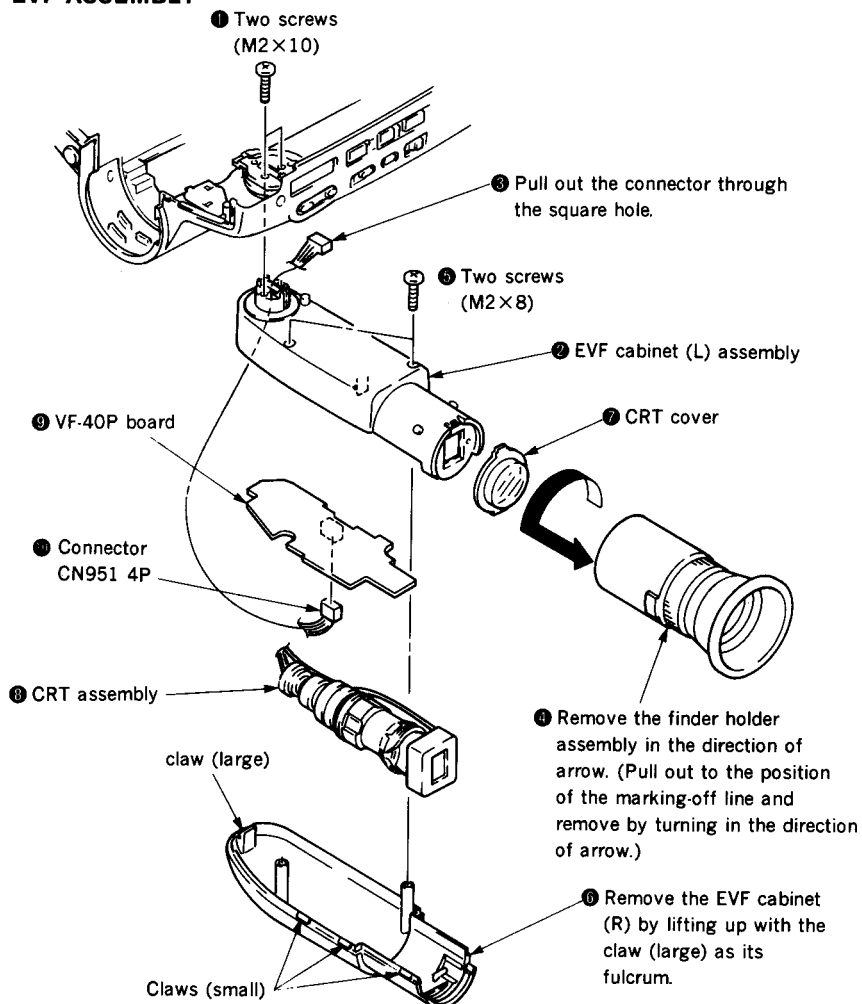
2-11. REMOVAL OF MD FRAME ASSEMBLY



2-12. REMOVAL OF VS-87 BOARD



2-13. REMOVAL OF EVF ASSEMBLY

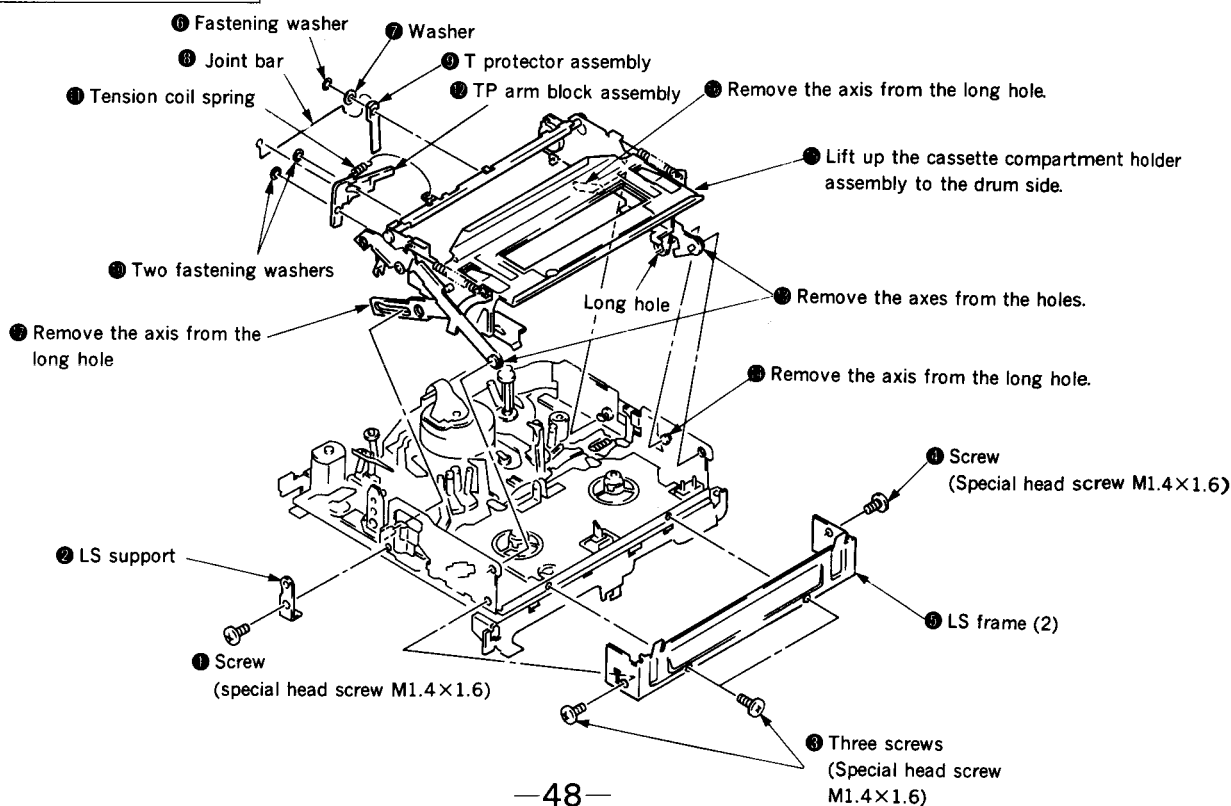


2-14. REMOVAL OF CASSETTE COMPARTMENT HOLDER ASSEMBLY

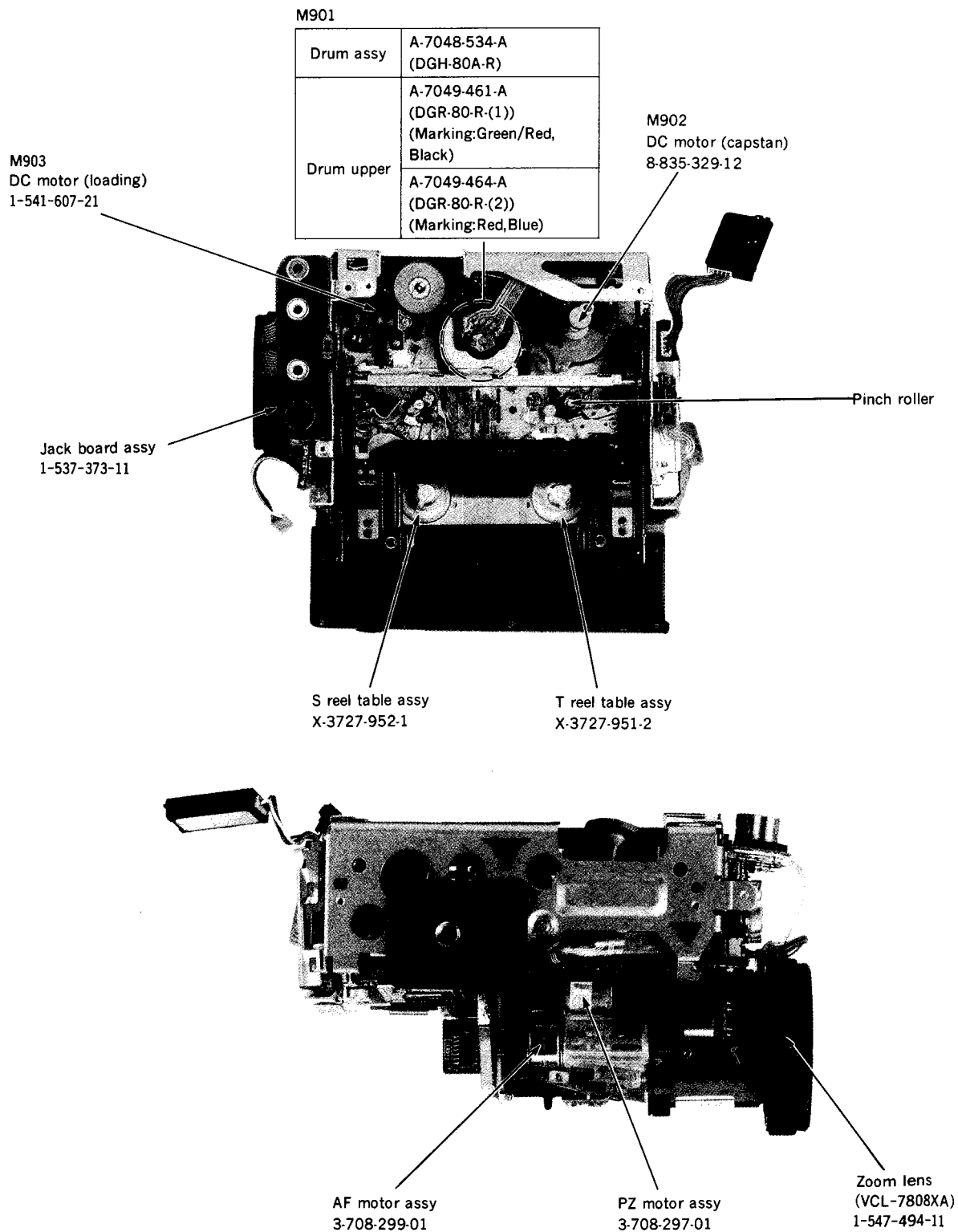
Note: In the beginning set to **USE** mode.

(When setting to **USE** mode, see "1-4. Handling of Mode Selector" in "8 mm video mechanical adjustment manual

II **FL Mechanism (Q mechanism)** ".)

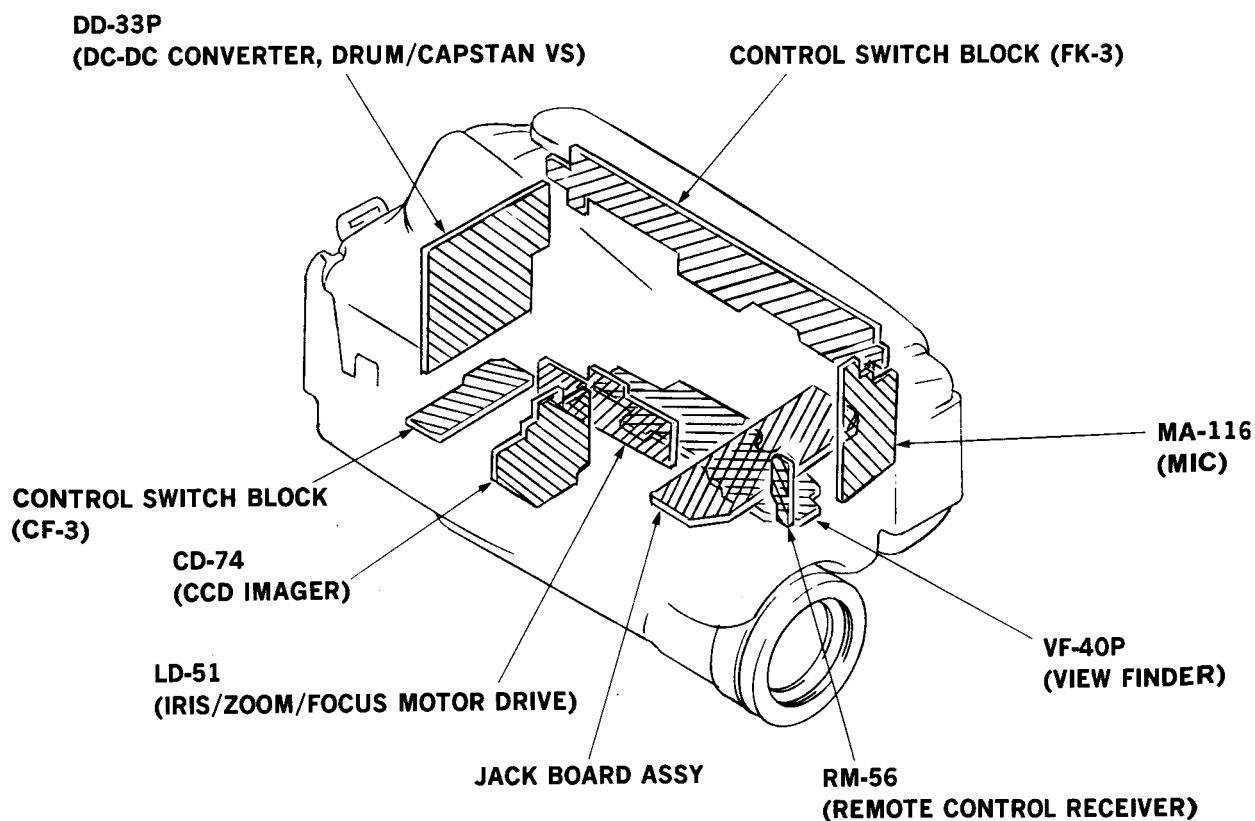
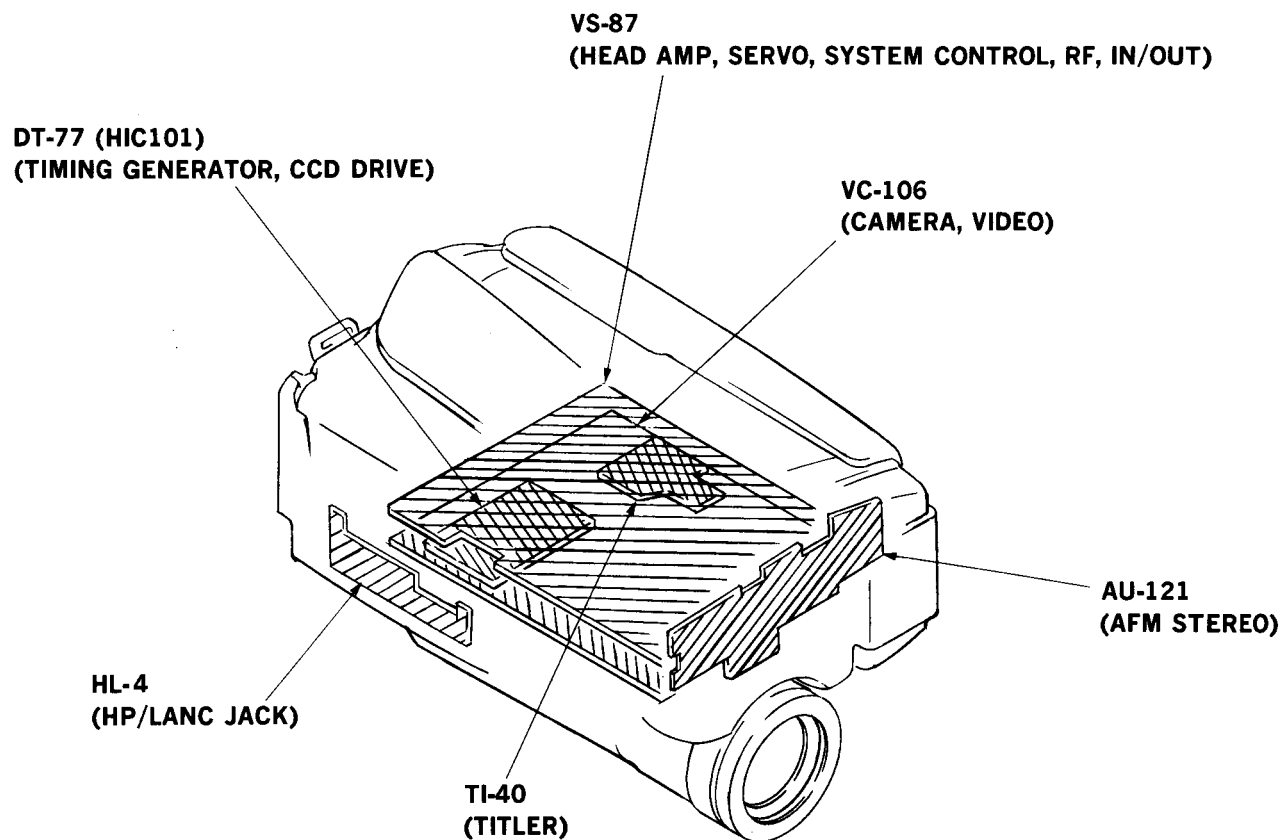


2-15. INTERNAL VIEWS
—Right side—

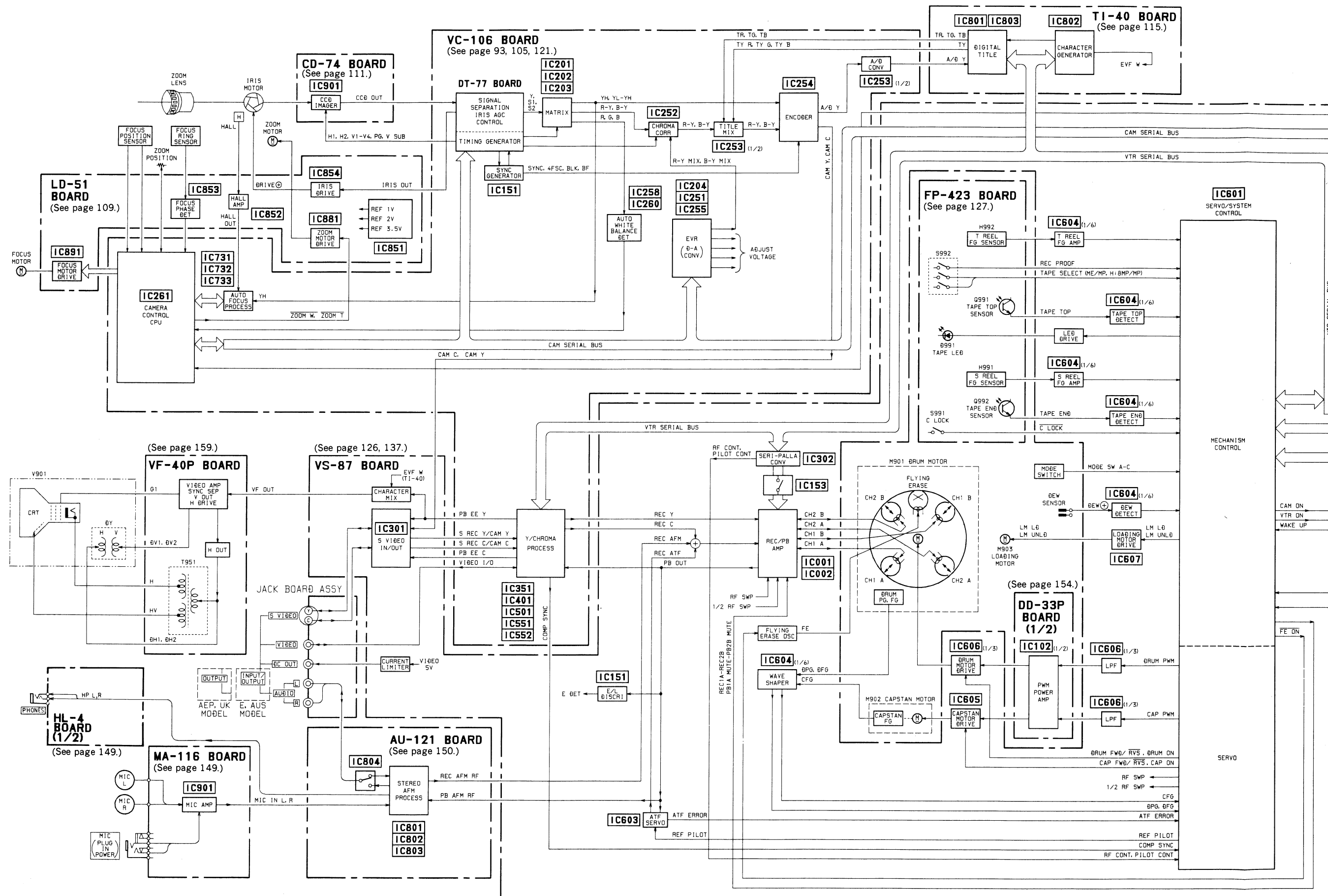


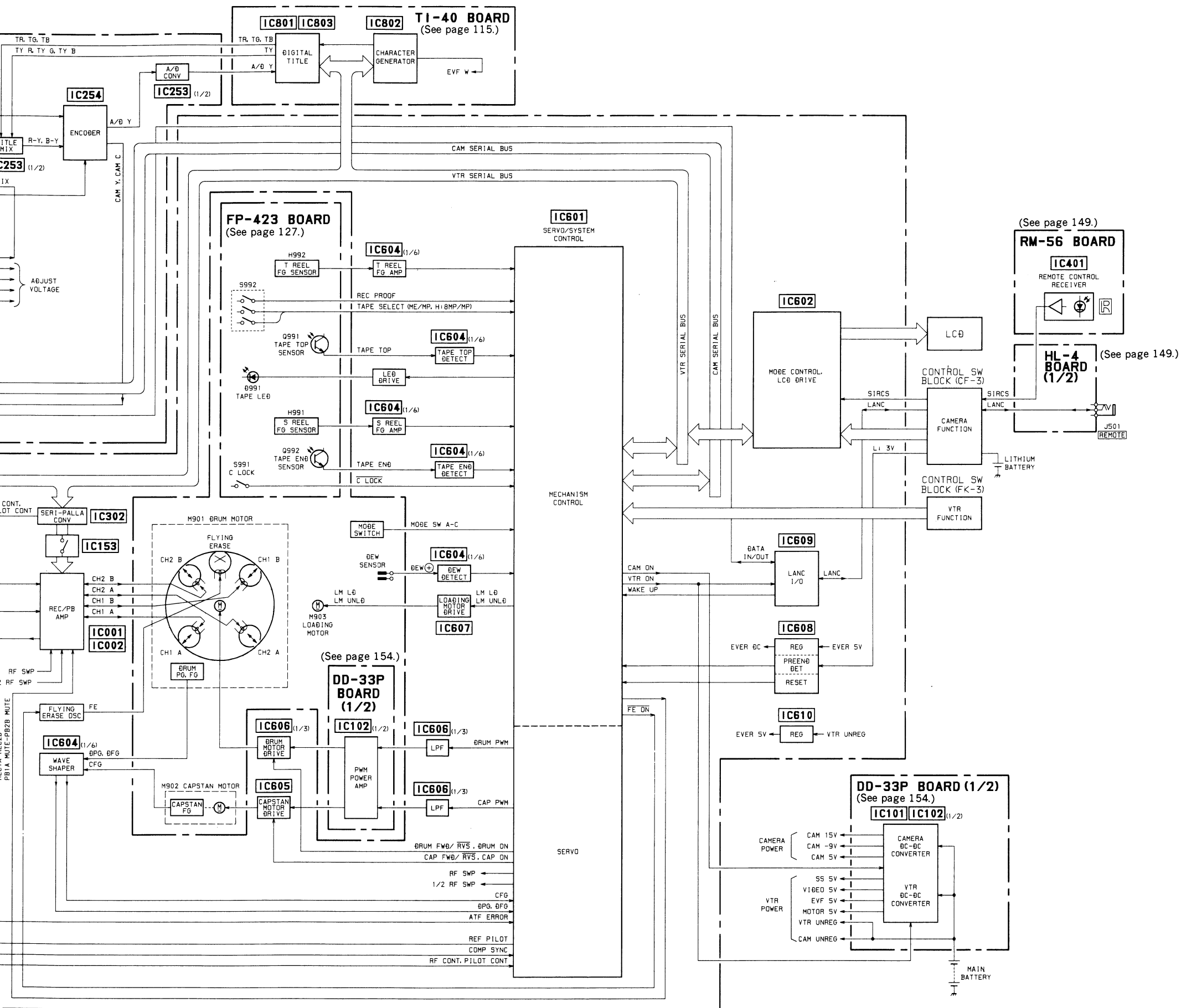
SECTION 3 DIAGRAMS

3-1. CIRCUIT BOARDS LOCATION

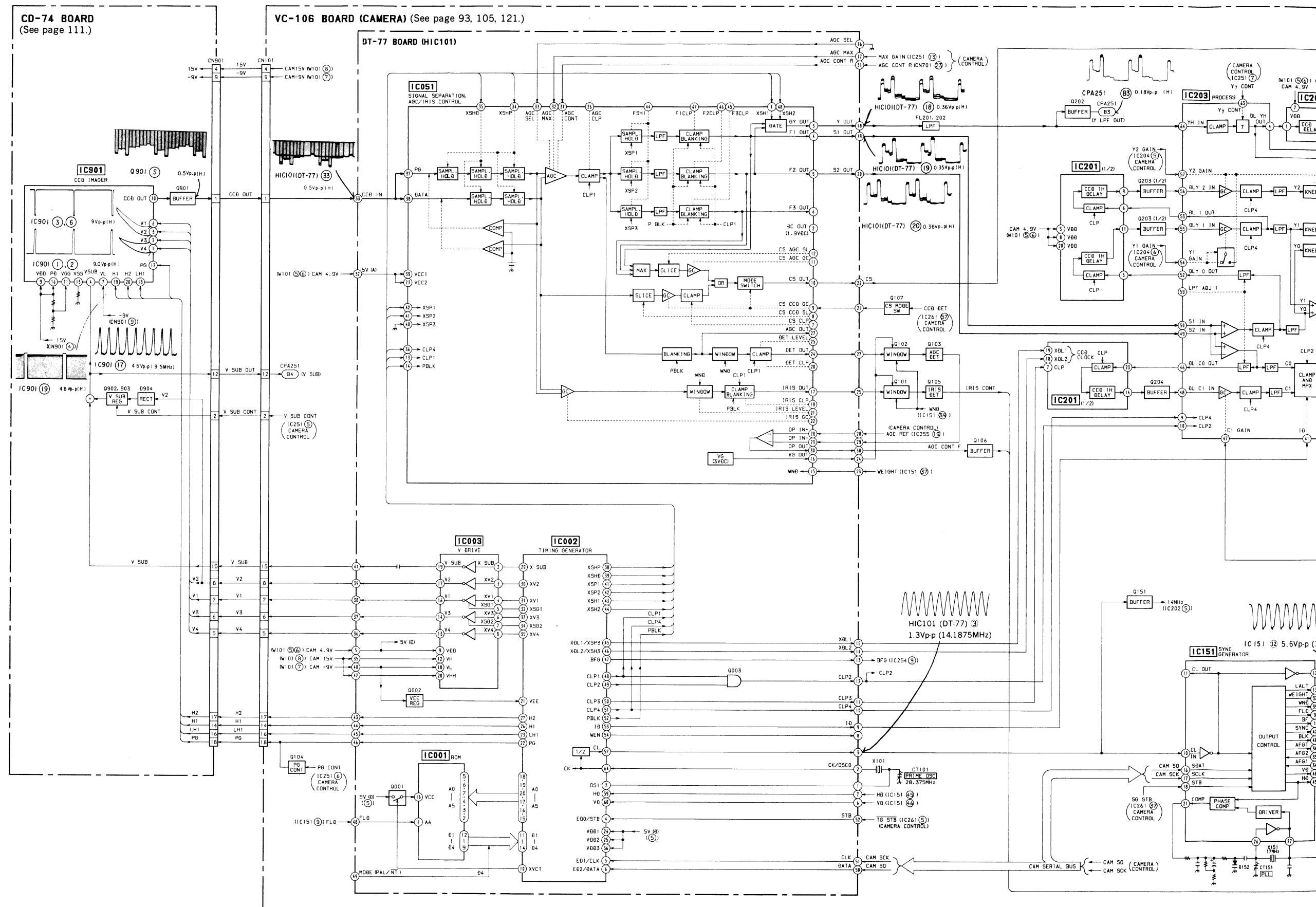


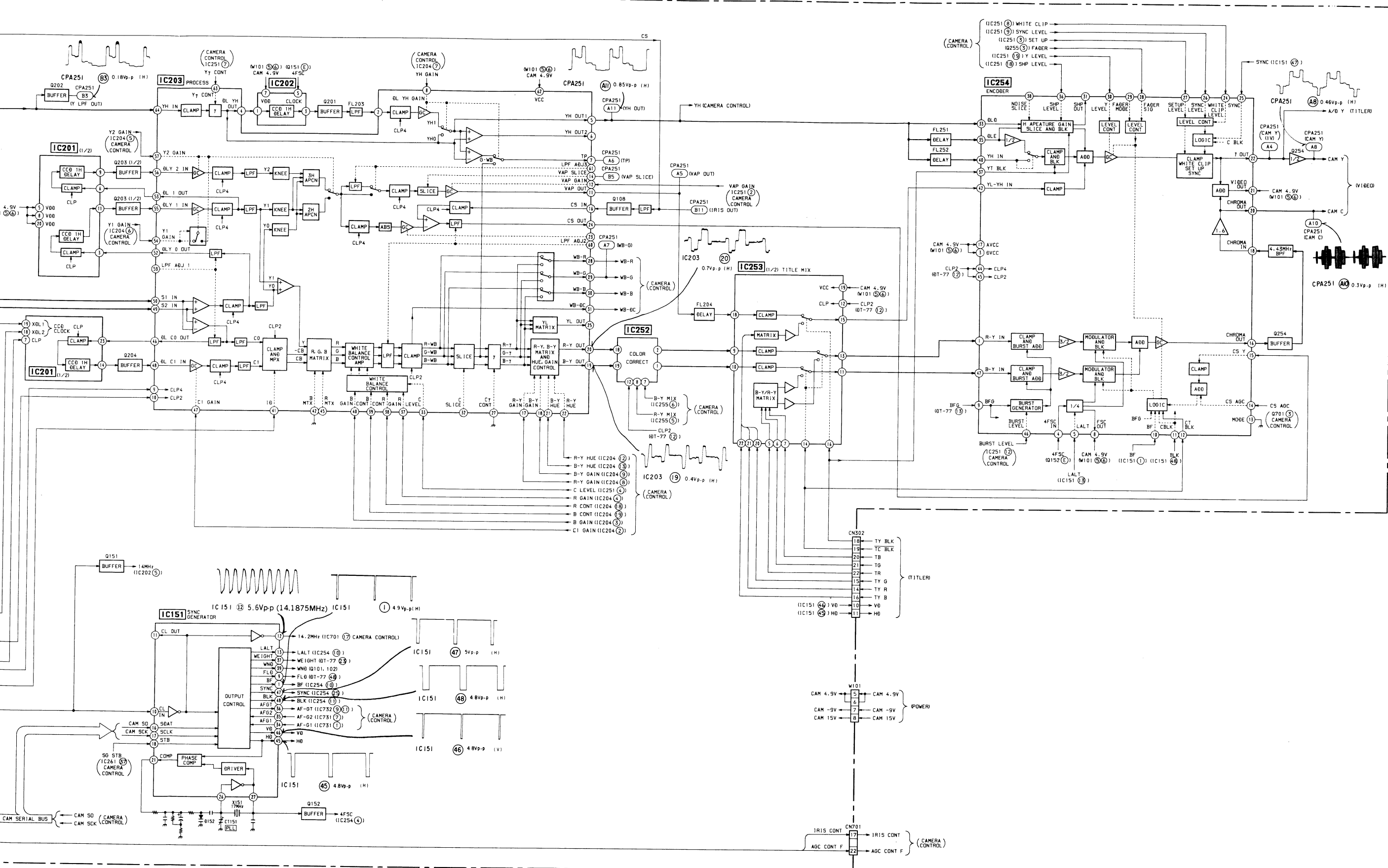
3-2. OVERALL BLOCK DIAGRAM



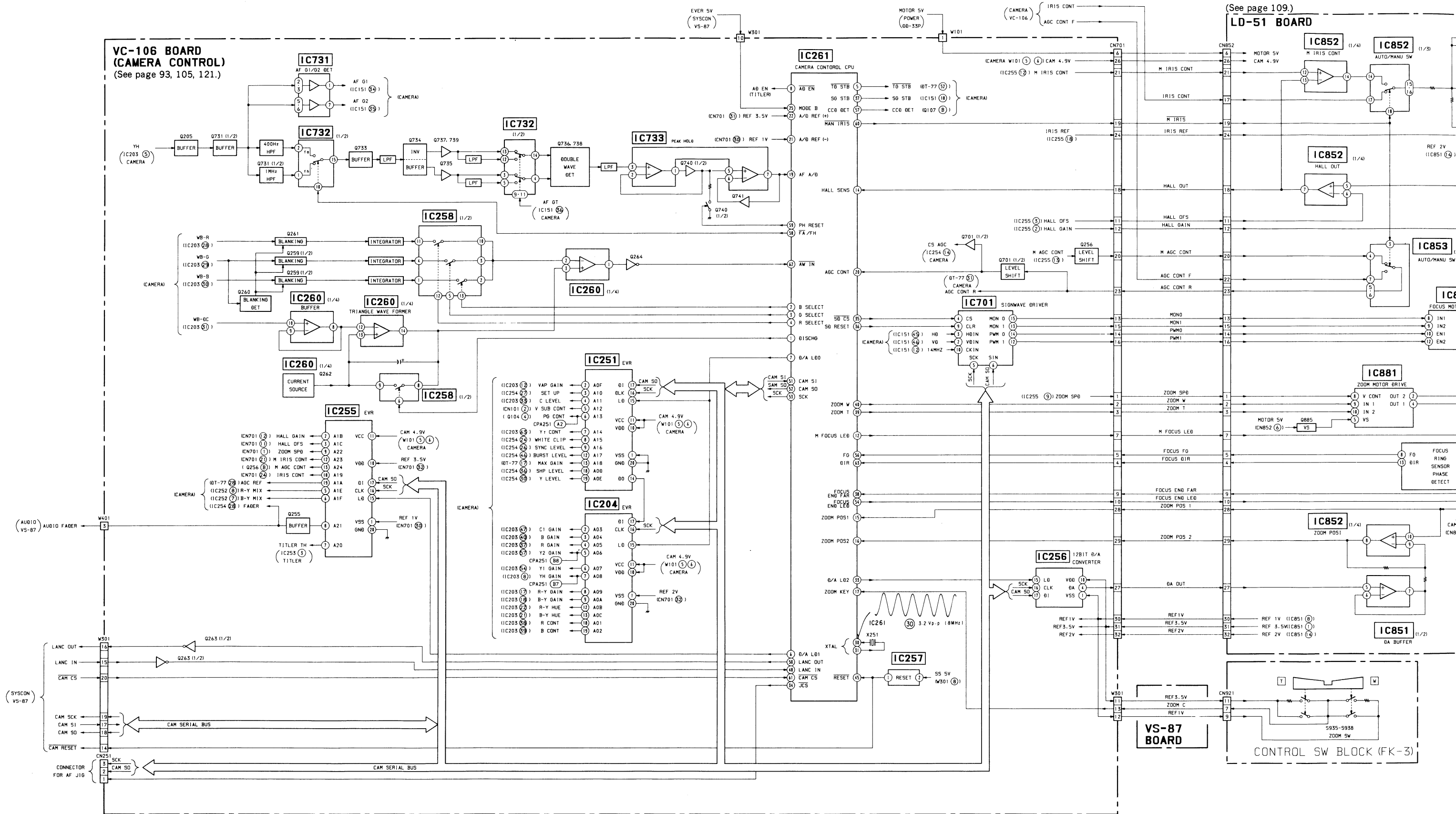


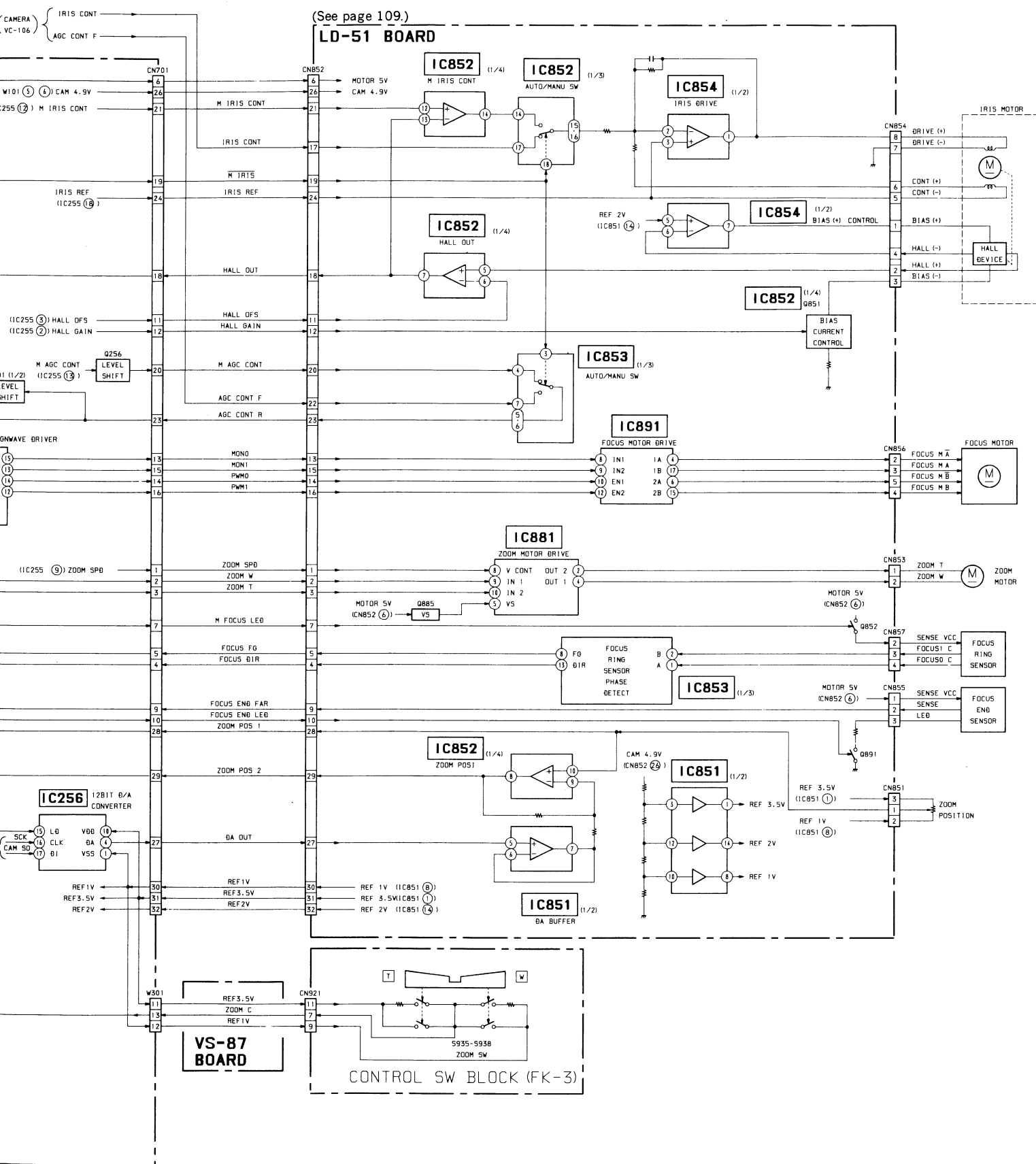
3-3. CAMERA BLOCK DIAGRAM





3-4. CAMERA CONTROL BLOCK DIAGRAM

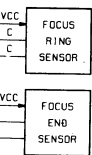
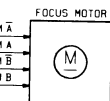
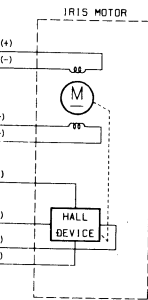




3-5. CAMERA SYSTEM CONTROL TERMINAL DESCRIPTION VC-106 BOARD IC261 (MC68HC11L6FU)

Pin No.	Signal Name	I/O	Function
1	DISCHG	O	AWB, AE integrating A/D reset pulse, V period "H" pulse
2	B SELECT	O	AWB measuring line select pulse (blue)
3	G SELECT	O	AWB measuring line select pulse (green)
4	R SELECT	O	AWB measuring line select pulse (red)
5	TG STB	O	Strobe signal to timing generator Camera mode ... V period "High" pulse. In VTR mode, this output becomes "Low".
6	D/A LD 1	O	Data load command to EVR (IC255), V period "High" pulse
7	D/A LD 0	O	Data load command to EVR (IC204,205), V period "High" pulse
8	AD EN	O	Titler 1-bit A/D converter operation ON/OFF output. Normally "High". When MODE button is pushed, this becomes 7V period "Low" pulse.
9	N.C		
10	N.C		
11	N.C		
12	M FOCUS LED	O	Manual focus sensor ON/OFF control. In manual focus mode, this output becomes "Low".
13	N.C		
14	HALL SENS	I	Hall element voltage input (analog input)
15	ZOOM POS 1	I	Zoom position detection voltage input (analog input)
16	ZOOM POS 2	I	Zoom position detection voltage input (analog input)
17	ZOOM KEY	I	Zoom switch voltage input (analog input)
18	N.C		
19	AF A/D	I	AF evaluation value detection input (analog input).
20	AGC CONT	I	AGC voltage input (analog input)
21	A/D REF (-)	-	Built-in A/D converter lower limit reference voltage (analog input)
22	A/D REF (+)	-	Built-in A/D converter upper limit reference voltage (analog input)
23	A VDD	-	SS 5V
24	VSS	-	GND
25	MODE B	-	Pull-up to EVER 5V
26	N.C		
27	N.C		
28	N.C		
29	N.C		
30	EXTAL	I	Clock oscillation
31	XTAL	O	
32	VDD	-	SS 5V
33	D/A LD 2	O	Data load command to 12-bit D/A converter (IC256), V period "High" pulse
34	JCS	O	Used for external indicator jig data latch, V period "High" pulse
35	SD CS	O	Sine wave driver chip select signal
36	SD RESET	O	Sine wave driver reset signal
37	SG STB	O	Sync generator data latch pulse
38	FOC END FAR	I	Focus lens initial position read
39	ZOOM T	O	Zoom motor telephotographic direction rotation designation
40	ZOOM W	O	Zoom motor wide angle direction rotation designation
41	N.C		
42	N.C		
43	N.C		
44	N.C		

Pin No.	Signal Name	I/O	Function
45			
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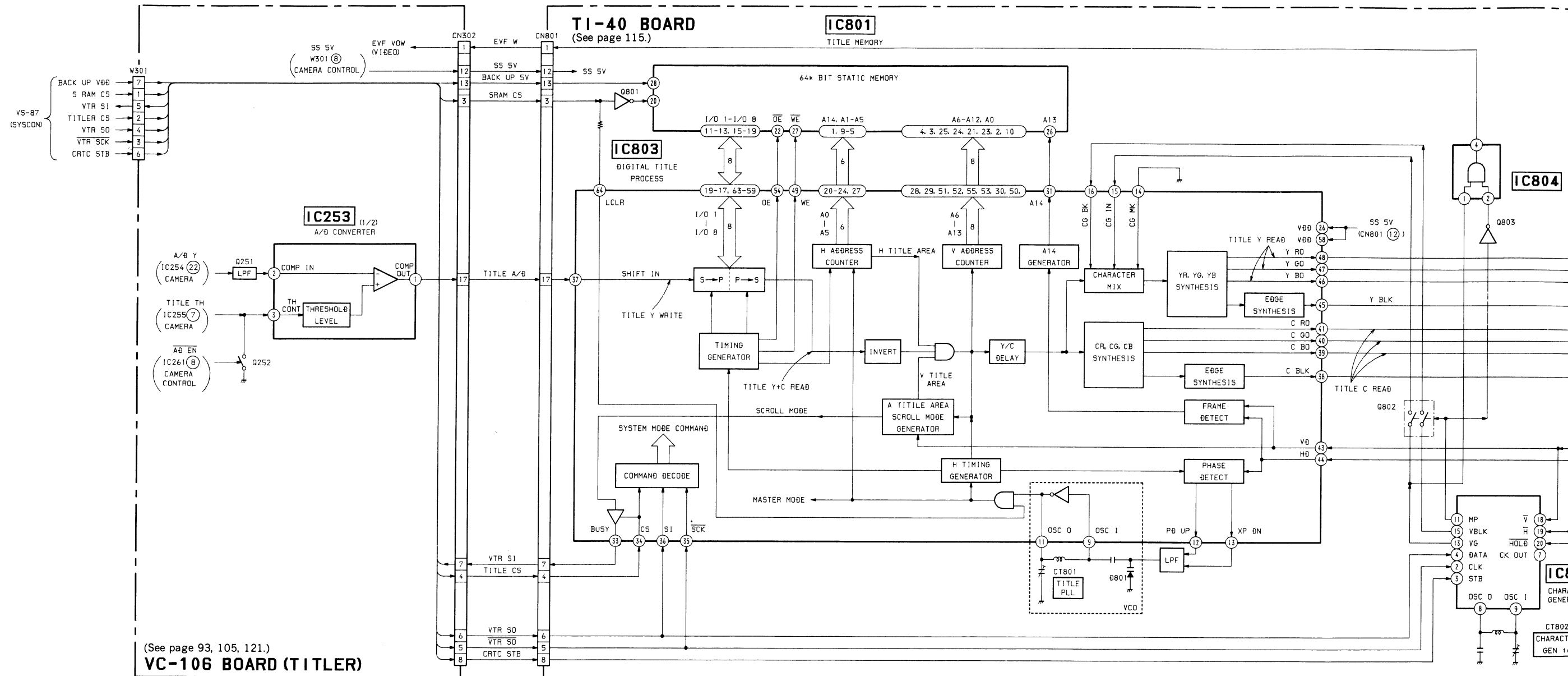


3-5. CAMERA SYSTEM CONTROL TERMINAL DESCRIPTION VC-106 BOARD IC261 (MC68HC11L6FU)

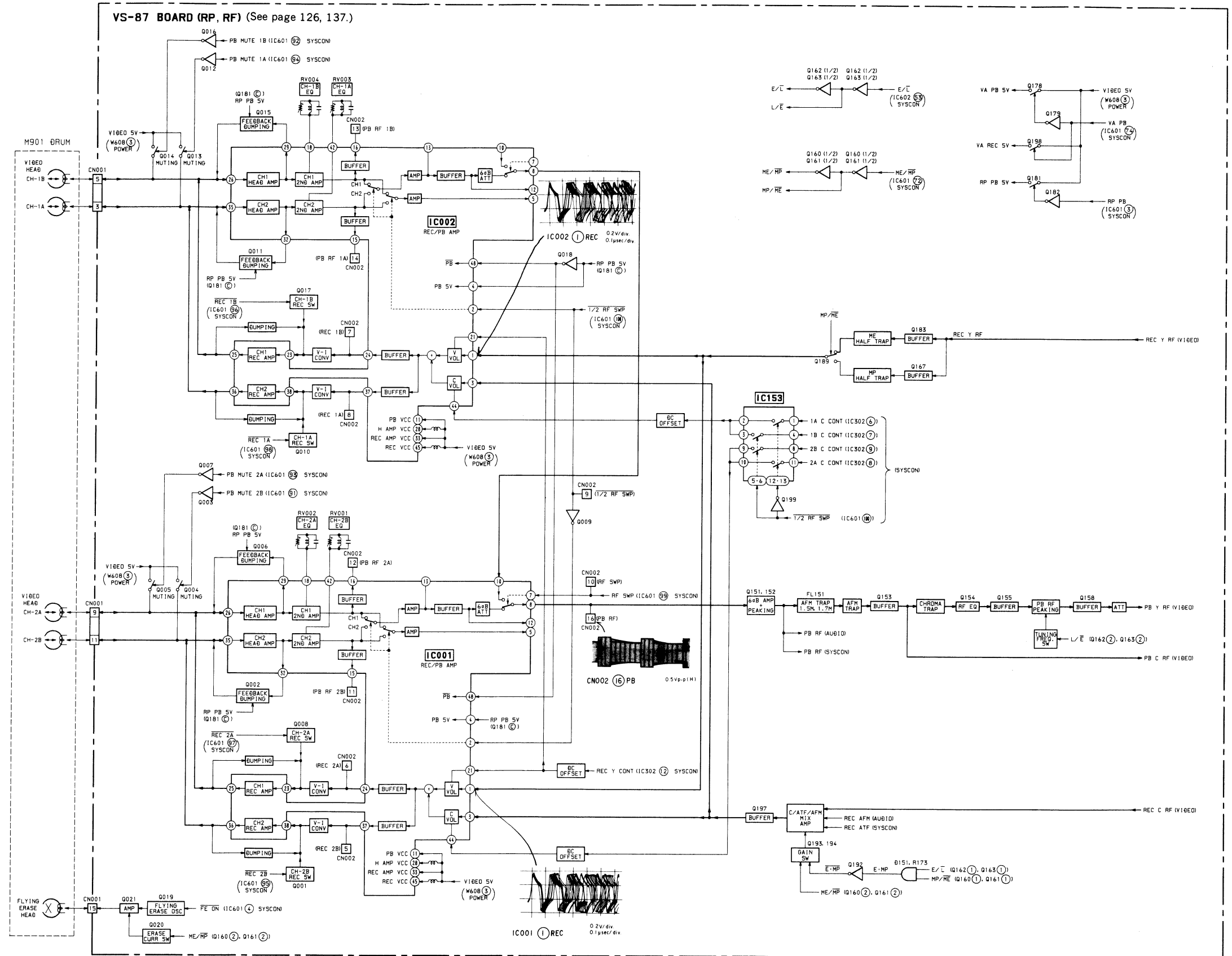
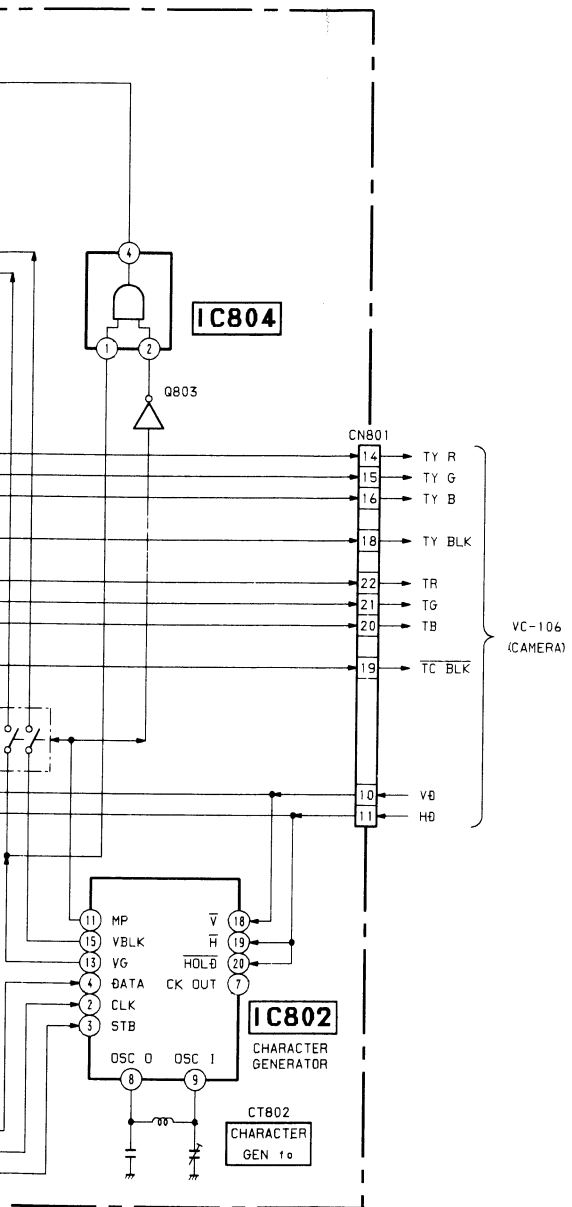
Pin No.	Signal Name	I/O	Function
1	DISCHG	O	AWB, AE integrating A/D reset pulse, V period "H" pulse
2	B SELECT	O	AWB measuring line select pulse (blue)
3	G SELECT	O	AWB measuring line select pulse (green)
4	R SELECT	O	AWB measuring line select pulse (red)
5	TG STB	O	Strobe signal to timing generator Camera mode ... V period "High" pulse. In VTR mode, this output becomes "Low".
6	D/A LD 1	O	Data load command to EVR (IC255), V period "High" pulse
7	D/A LD 0	O	Data load command to EVR (IC204,205), V period "High" pulse
8	AD EN	O	Titler 1-bit A/D converter operation ON/OFF output. Normally "High". When MODE button is pushed, this becomes 7V period "Low" pulse.
9	N.C		
10	N.C		
11	N.C		
12	M FOCUS LED	O	Manual focus sensor ON/OFF control. In manual focus mode, this output becomes "Low".
13	N.C		
14	HALL SENS	I	Hall element voltage input (analog input)
15	ZOOM POS 1	I	Zoom position detection voltage input (analog input)
16	ZOOM POS 2	I	Zoom position detection voltage input (analog input)
17	ZOOM KEY	I	Zoom switch voltage input (analog input)
18	N.C		
19	AF A/D	I	AF evaluation value detection input (analog input).
20	AGC CONT	I	AGC voltage input (analog input)
21	A/D REF (-)	-	Built-in A/D converter lower limit reference voltage (analog input)
22	A/D REF (+)	-	Built-in A/D converter upper limit reference voltage (analog input)
23	A VDD	-	SS 5V
24	VSS	-	GND
25	MODE B	-	Pull-up to EVER 5V
26	N.C		
27	N.C		
28	N.C		
29	N.C		
30	EXTAL	I	Clock oscillation
31	XTAL	O	
32	VDD	-	SS 5V
33	D/A LD 2	O	Data load command to 12-bit D/A converter (IC256), V period "High" pulse
34	JCS	O	Used for external indicator jig data latch, V period "High" pulse
35	SD CS	O	Sine wave driver chip select signal
36	SD RESET	O	Sine wave driver reset signal
37	SG STB	O	Sync generator data latch pulse
38	FOC END FAR	I	Focus lens initial position read
39	ZOOM T	O	Zoom motor telephotographic direction rotation designation
40	ZOOM W	O	Zoom motor wide angle direction rotation designation
41	N.C		
42	N.C		
43	N.C		
44	N.C		

Pin No.	Signal Name	I/O	Function
45	RESET	-	Reset.
46	XIRQ	I	Pull-up to SS 5V
47	IRQ	I	Pull-up to SS 5V
48	LANC IN	I	LANC input
49	VSS	-	GND
50	LANC OUT	O	LANC output
51	CAM SI	I	Serial data input from servo/system control
52	CAM SO	O	Serial data input to servo/system control and slave
53	SCK	O	Serial clock to servo/system control and slave
54	FOC END LED	O	Focus end LED drive
55	VDD	-	SS 5V
56	FG	I	Focus ring rotational speed input (PWM method)
57	CCD DET	O	CCD DET switch changeover
58	FA/FH	O	AF detection frequency range changeover. FA: 400kHz~; FH: 1MHz~.
59	PH RESET	O	Peak hold IC (IC733) reset
60	MAN IRIS	O	IRIS system AUTO/MANUAL changeover
61	CAM CS	I	Chip select signal from servo/system control
62	AW IN	I	Comparator input of integrating A/D converter for auto white balance
63	DIR	I	Focus ring rotation direction input
64	VSS	-	GND

3-6. TITLER BLOCK DIAGRAM

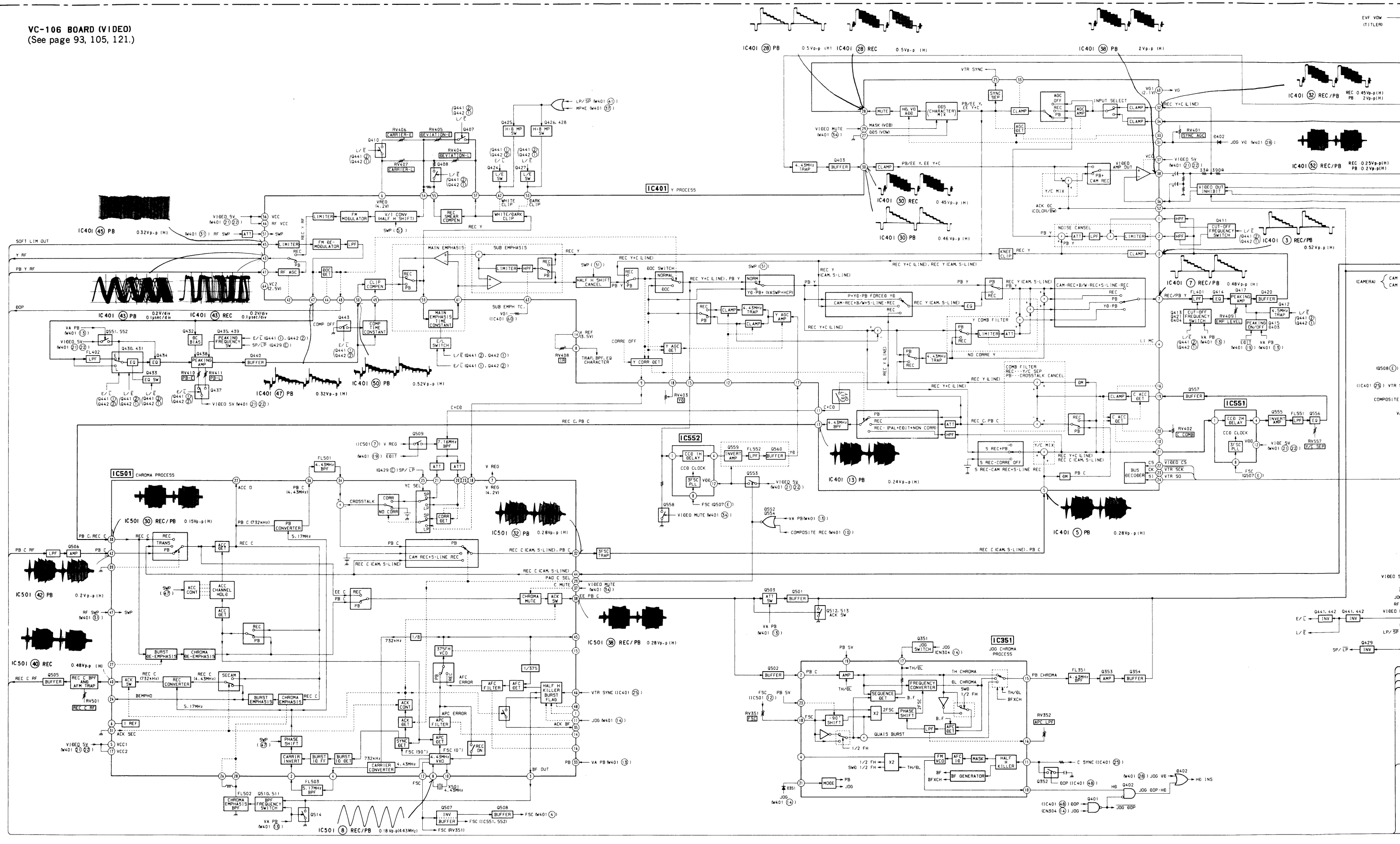


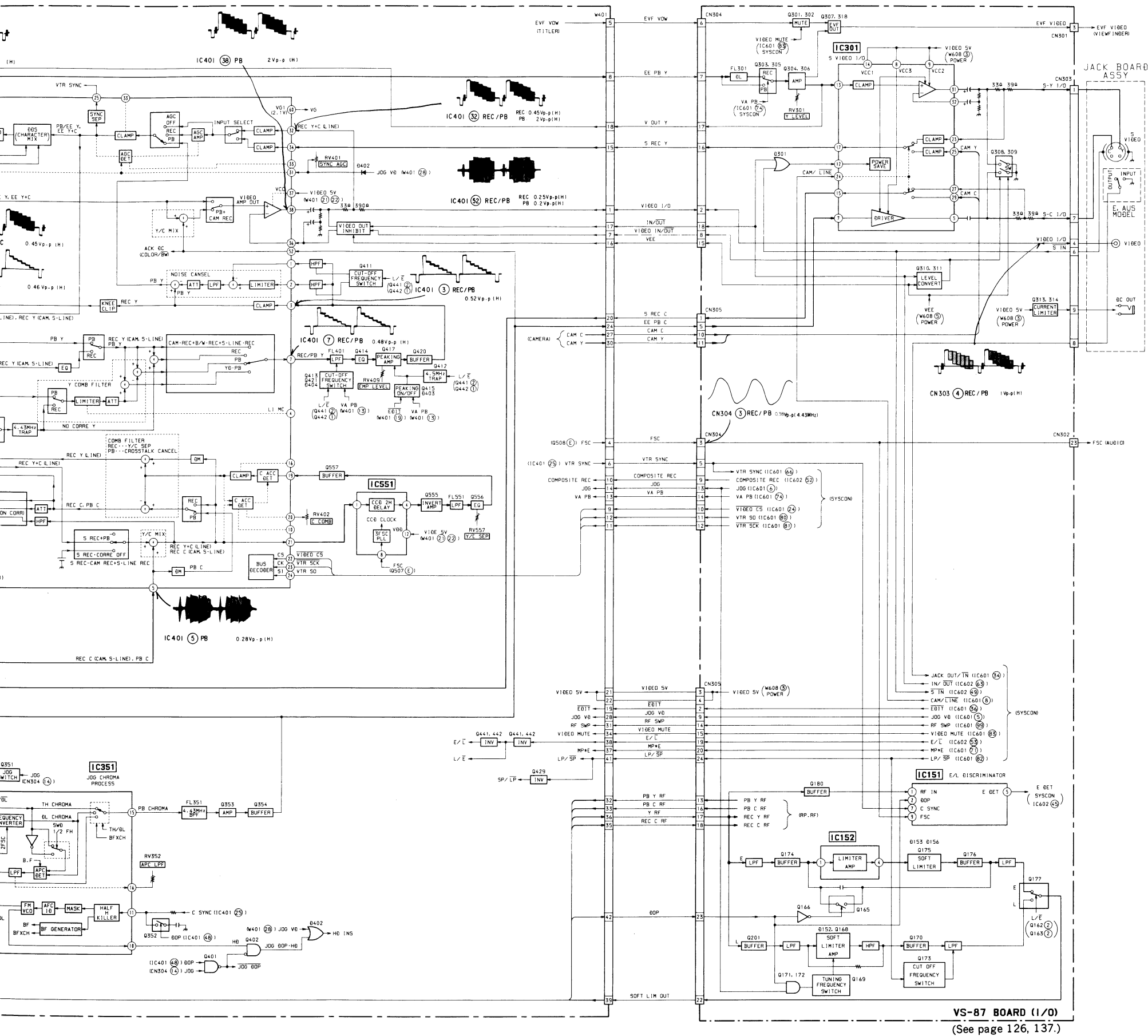
3-7. HEAD AMP, RF BLOCK DIAGRAM

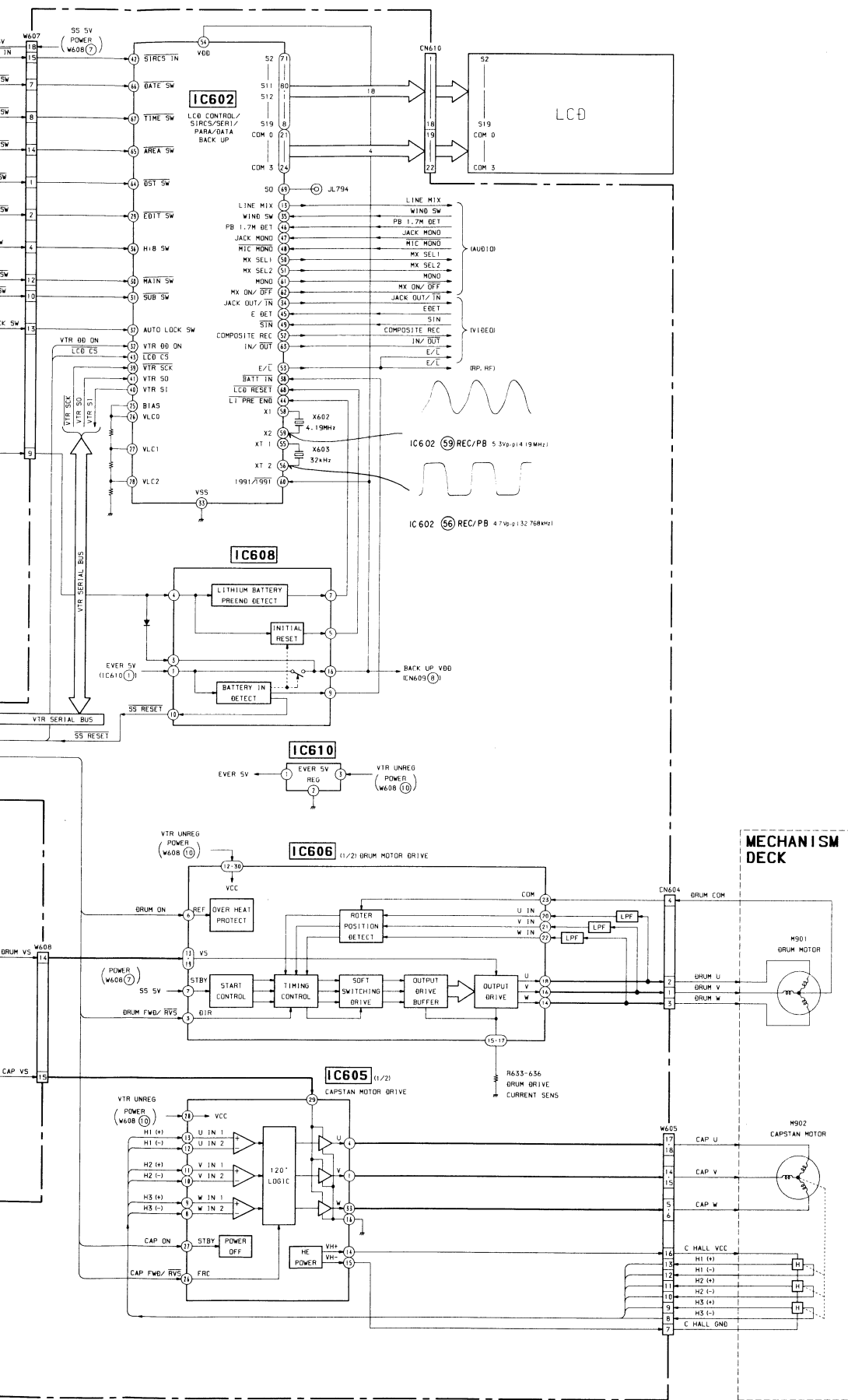


3-8. VIDEO BLOCK DIAGRAM

VC-106 BOARD (VIDEO)
(See page 93, 105, 121.)







3-10. SERVO, SYSTEM CONTROL TERMINAL DESCRIPTION VS-87 BOARD IC601 (CXP80624)

Pin No.	Signal Name	I/O	Function															
1	CAP ON	O	Capstan driver ON control signal															
2	CAP FWD/RVS	O	Capstan rotation direction control signal. “High”: FWD; “Low”: RVS.															
3	RP PB	O	REC/PB mode changeover signal for REC/PB amplifier (VS-87 board IC001,002), ATF IC															
4	FE ON	O	Flying erase oscillation ON/OFF signal. “Low”: oscillation ON.															
5	JOG VD	O	Quasi VD output to be inserted into video signal when variable speed playback is executed.															
6	JOG	O	Normal/JOG mode changeover signal. “High”: JOG mode.															
7	CAM RESET	O	Camera microcomputer reset signal															
8	CAM/LINE	O	Camera/line changeover output. “High”: camera mode; “Low”: VTR mode.															
9	VTR DD ON	O	DC-DC converter (VTR system) control signal															
10	CAM DD ON	O	DC-DC converter (camera system) control signal															
11	CAM CS (O)	O	Chip select signal for communications between camera and microcomputer															
12	MODE SW C	I	Mechanical position input (MODE switch)															
13	MODE SW B	I																
14	MODE SW A	I																
15	START/ STOP SW	I	START/STOP switch input (microcomputer standby release input)															
16	EJECT SW	I	EJECT switch input (microcomputer standby release input)															
17	CAM POWER SW	I	CAMERA POWER switch input (microcomputer standby release input)															
18	VTR POWER SW	I	VTR POWER switch input (microcomputer standby release input)															
19	CC LOCK SW	I	CASSETTE IN switch input. “Low”: Cassette IN.															
20	LANC POWER ON	I	Input to turn this unit ON with LANC (microcomputer standby release input)															
21	DEW DET	I	Condensation sensor input. “Low”: condensing.															
22	LM LIM ON	I	Loading motor current limiter operation detection signal															
23	SRAM CS	O	Chip select signal to SRAM (TI-40 board IC801)															
24	VIDEO CS	O	Chip select signal to video IC (VC-106 board IC401)															
25	CRTC STB	O	Strobe signal for character generator (TI-40 board IC802)															
26	AUDIO MUTE	O	Audio Mute signal to AFM IC (AU-121 board IC801, IC802)															
27	TITLER CS	O	Chip select signal to digital titler (TI-40 board IC803)															
28	LCD CS	O	Chip select signal to LCD microcomputer (VS-87 board IC602)															
29	VTR DA LD	O	Data load signal to EVR (VS-87 board IC302)															
30	N.C																	
31	UNLOAD	O	Loading motor control signal <table><tr><td></td><td>OFF</td><td>LOADING</td><td>UNLOADING</td><td>BRAKE</td></tr><tr><td>LOAD</td><td>Low</td><td>High</td><td>Low</td><td>High</td></tr><tr><td>UNLOAD</td><td>Low</td><td>Low</td><td>High</td><td>High</td></tr></table> (The microcomputer terminal is N-ch open drain.)		OFF	LOADING	UNLOADING	BRAKE	LOAD	Low	High	Low	High	UNLOAD	Low	Low	High	High
	OFF	LOADING		UNLOADING	BRAKE													
LOAD	Low	High		Low	High													
UNLOAD	Low	Low	High	High														
32	LOAD	O																
33	LM LIM CONT	O	Loading motor driver current limiter control signal (N-ch open drain)															
34	DRUM ON	O	Drum motor drive control signal Z : Motor ON (N-ch open drain)															

Pin No.	Signal Name	I/O	Function
35	DRUM FWD/ RVS	O	Drum rotation direction control signal. "Low": RVS; "High": FWD (N-ch open drain).
36	$\overline{\text{EDIT}}$	O	EDIT ON/OFF control signal. "Low": EDIT, interlocked with EDIT key (N-ch open drain).
37	TALLY LED	O	External TALLY LED/EVF internal TALLY drive LED illumination. When the LED is illuminated, this output becomes "Low" (N-ch open drain).
38	REEL HALL CONT	O	Reel sensor control signal. "Low": Sensor ON (N-ch open drain).
39	MP	I	Microprocessor mode select pin, not selected in this unit.
40	SS RESET	I	Reset pin
41	VSS	—	GND
42	XTAL	O	Clock oscillation (The clock is supplied to ATF IC from this unit.)
43	EXTAL	I	
44	CAM CS (I)	I	Automatic transfer control circuit for communications with camera microcomputer
45	CAM SO	I	Serial data input from camera microcomputer
46	CAM SI	O	Serial data output to camera microcomputer
47	CAM SCK	I	Serial clock input from camera microcomputer
48	KEY 3 AD	I	A/D input for key read, CF block (camera system function)
49	KEY 2 AD	I	
50	KEY 1 AD	I	A/D input for key read, FK block (VTR system function)
51	KEY 0 AD	I	
52	AVSS	—	A/D converter GND
53	AVREF	—	A/D converter Reference voltage
54	AVDD	—	A/D converter power
55	HH SENSE	I	Not used (connected to VDD)
56	TAPE END	I	Tape end sensor input. "High": Tape end.
57	TAPE TOP	I	Tape top sensor input. "High": Tape top.
58	PATH MODE	I	Tape path adjustment mode input pin. Normally "High". When adjustment is made, this input becomes "Low".
59	BATT SENSE	I	Battery end/pre end voltage input. A/D input pin.
60	ATF ERROR	I	ATF error (ATF LOCK error) input. A/D input pin.
61	S REEL	I	Supply side reel sensor Input. A/D input pin.
62	T REEL	I	Takeup side reel sensor input. A/D input pin.
63	ME/MP SW	I	ME/MP tape discrimination input. "High": ME tape.
64	REC PROOF SW	I	Careless erase prevention discrimination input. "High": Careless erase prevention.
65	BRIGHT B	I	Brightness control dial input (B phase)
66	VTR SYNC	I	Composite sync signal input
67	Hi8 MP SW	I	Hi8 MP tape discrimination input. "High": Hi8 MP tape.
68	DRUM PG	I	Drum PG input FRC (high precision timer) capture input pin
69	DRUM FG	I	Drum PG input FRC (high precision timer) capture input pin.
70	CAP FG	I	Capstan FG input FRC (high precision timer) capture input pin
71	MP * E	O	When a Hi8 MP tape is used and E mode is activated, this output becomes "High".
72	ME/MP	O	ME/MP tape discrimination output. "High": ME tape.

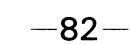
Pin No.	Signal Name	I/O	Function
73	TAPE LED CONT	O	Tape top/end sensor LED drive control. "High": LED ON.
74	VA PB	O	Video/audio system REC/PB mode changeover. "High": PB mode.
75	CAP PWM	O	PWM output pin for capstan error output. Output pin dedicated to servo (PWM mode).
76	DRUM PWN	O	PWM output pin for drum error output. Output pin dedicated to servo (PWM mode).
77	CFG HMS	I	HMS counter capstan FG input (Event counter input)
78	BRIGHT A	I	Brightness control dial input (A phase)
79	VTR SI	I	Serial data input from LCD microcomputer
80	VTR SO	O	Serial data output to VTR system
81	VTR SCK	O	Serial clock output to VTR system
82	LP/ $\overline{\text{SP}}$	O	SP/LP mode discrimination signal output. "Low": SP mode.
83	VIDEO MUTE	O	Video mute output to VTR system
84	CLOG DET	O	Clog detection signal input. "High": Clog.
85	REF PILOT	O	ATF IC ATF reference pilot signal output
86	SP/ $\overline{\text{LP}}$ DET	I	SP/LP mode discrimination signal input. "High": SP mode, during FF, REV, CUE, REV, EDIT(—).
87	NC	—	
88	VSS	—	GND
89	VDD	—	EVER 5V
90	(VPP)	—	EVER 5V
91	PB MUTE 2B	O	Control signal for preventing crosstalk from other head in playback mode. "High": Mute
92	PB MUTE 1B	O	
93	PB MUTE 2A	O	
94	PB MUTE 1A	O	
95	REC 2B	O	Drum head (1A, 2A, 1B, 2B) changeover recording timing signal. "Low": REC.
96	REC 1B	O	
97	REC 2A	O	
98	REC 1A	O	
99	RF SWP	O	RF SWP output pin
100	1/2 RF SWP	O	1/2 RF SWP output pin. "Low": A-ch; "High" B-ch.

3-11. MODE CONTROL TERMINAL DESCRIPTION VS-87 BOARD IC602 (μPD75304)

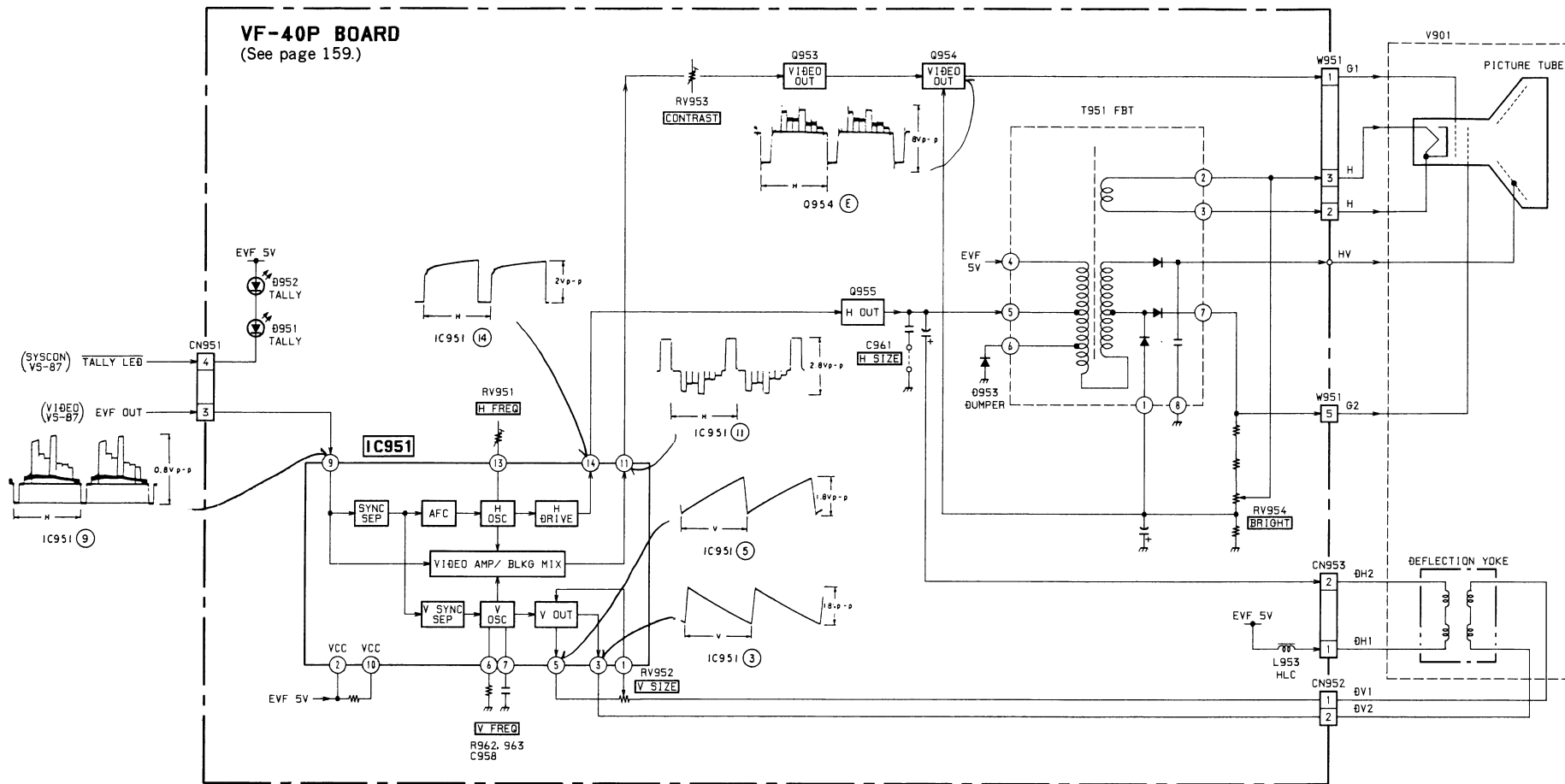
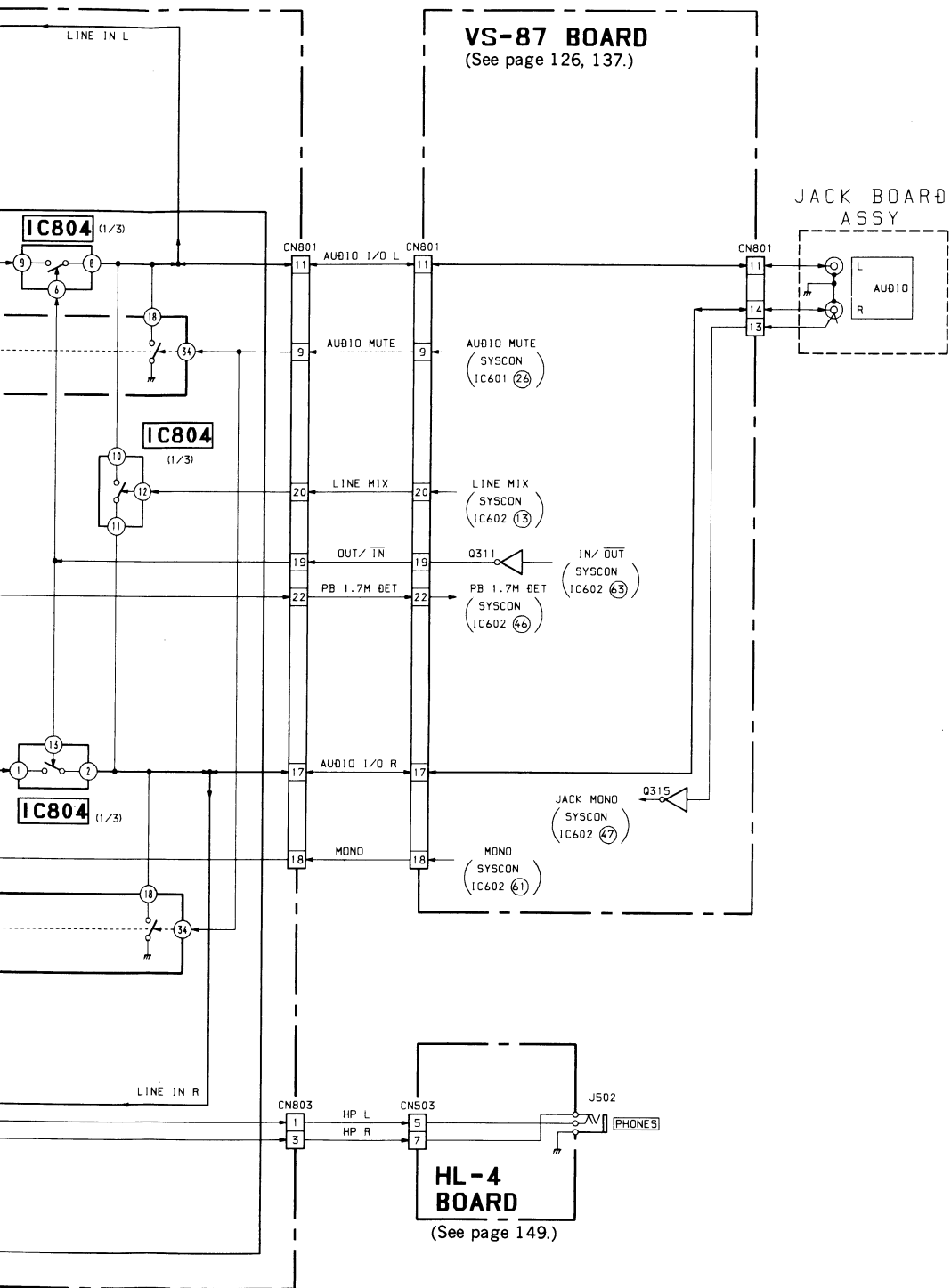
Pin No.	Signal Name	I/O	Function
1	S12	O	Segment signal output
2	S13	O	LCD segment terminal drive
3	S14	O	LCD segment signal output pin (Output of one of four values : 0, 1.7, 3.3, 5V).
4	S15	O	
5	S16	O	
6	S17	O	
7	S18	O	
8	S19	O	
9	(S20)	O	Not used
10	(S21)	O	
11	(S22)	O	
12	(S23)	O	
13	LINE MIX	O	Audio system control signal
14	(S25)	O	Not used
15	(S26)	O	
16	(S27)	O	
17	(S28)	O	
18	(S29)	O	
19	(S30)	O	
20	(S31)	O	LCD common terminal drive output for common signal output
21	COM 0	O	
22	COM 1	O	
23	COM 2	O	
24	COM 3	O	Output pin used for external split resistor cut. Power input.
25	BIAS	O	
26	VLC 0	I	
27	VLC 1	I	
28	VLC 2	I	Power for LCD drive. Normally 3.3V. For backup, 3V is input.
29	EDIT SW	I	Edit switch input
30	MAIN SW	I	Bilingual main switch input
31	SUB SW	I	Bilingual sub switch input
32	VTR DD ON	I	VTR system power control signal input
33	VSS	—	GND
34	JACK OUT/IN	I	Line input/output chanegover switch input
35	WIND SW	I	Wind reduction switch input
36	Hi8 SW	I	Hi8 auto/OFF switch input
37	AUTO LOCK SW	I	Auto lock switch input
38	BATT IN	I	Set “Low” to switch to 32 kHz clock. Set “High” to switch to 4.19MHz clock. When battery is OFF, set “Low”.
39	VTR SCK	I	Serail clock input from servo/system control
40	VTR SI	O	Serial data input from servo/system control
41	VTR SO	I	Serial data input from servo/system control
42	SIRCS IN	I	SIRCS signal input

Pin No.	Signal Name	I/O	Function
43	LCD CS	I	Chip select signal from servo/system control
44	LI PRE END	I	Lithium battery pre end detection. Normally “High”. When battery voltage is reduced, this input becomes “Low”.
45	E DET	I	Hi8/normal discrimination input in playback mode. “High” : Hi8.
46	PB 1.7M DET	I	Input which discriminates between stereo and bilingual/monoral in playback mode. “High” : Stereo or bilingual.
47	JACK MONO	I	Audio line IN/OUT jack monoral detection
48	MIC MONO	I	Mic jack monoral detection
49	S IN	I	S video connector connected/not connected detection
50	MX SEL 1	O	Audio block L-ch/R-ch select signal
51	MX SEL 2	O	
52	COMPOSITE REC	O	When VTR mode, line input is selected, this output becomes “High”.
53	E/L	O	Hi8/Normal mode output. “High” : Hi8.
54	VDD	—	Back up VDD
55	XT1	I	Clock oscillation 32kHz
56	XT2	O	
57	NC		
58	X1	I	Clock oscillation 4.19MHz
59	X2	O	
60	1991/1991	I	Date setting. “High” : Start from 1991 ; “Low” : Start from 1990. This input is set “High” in this unit.
61	MONO	O	Stereo/monoral changeover output. “High” : Monoral.
62	MX ON/OFF	O	Matrix IC ON/OFF signal
63	IN/OUT	O	INPUT/OUTPUT changeover output
64	DST SW	I	Summer time switch input
65	AREA SW	I	Area switch input
66	DATE SW	I	Date switch input
67	TIME SW	I	Time switch input
68	LCD RESET	I	Reset
69	S0	O	Clock oscillation circuit dividing output (512kHz)
70	S1		LCD segment signal output pin. Not used.
71	S2	O	LCD segment signal output pin (output of one of four values : 0, 1.7, 3.3 and 5V).
72	S3	O	
73	S4	O	
74	S5	O	
75	S6	O	
76	S7	O	
77	S8	O	
78	S9	O	
79	S10	O	
80	S11	O	

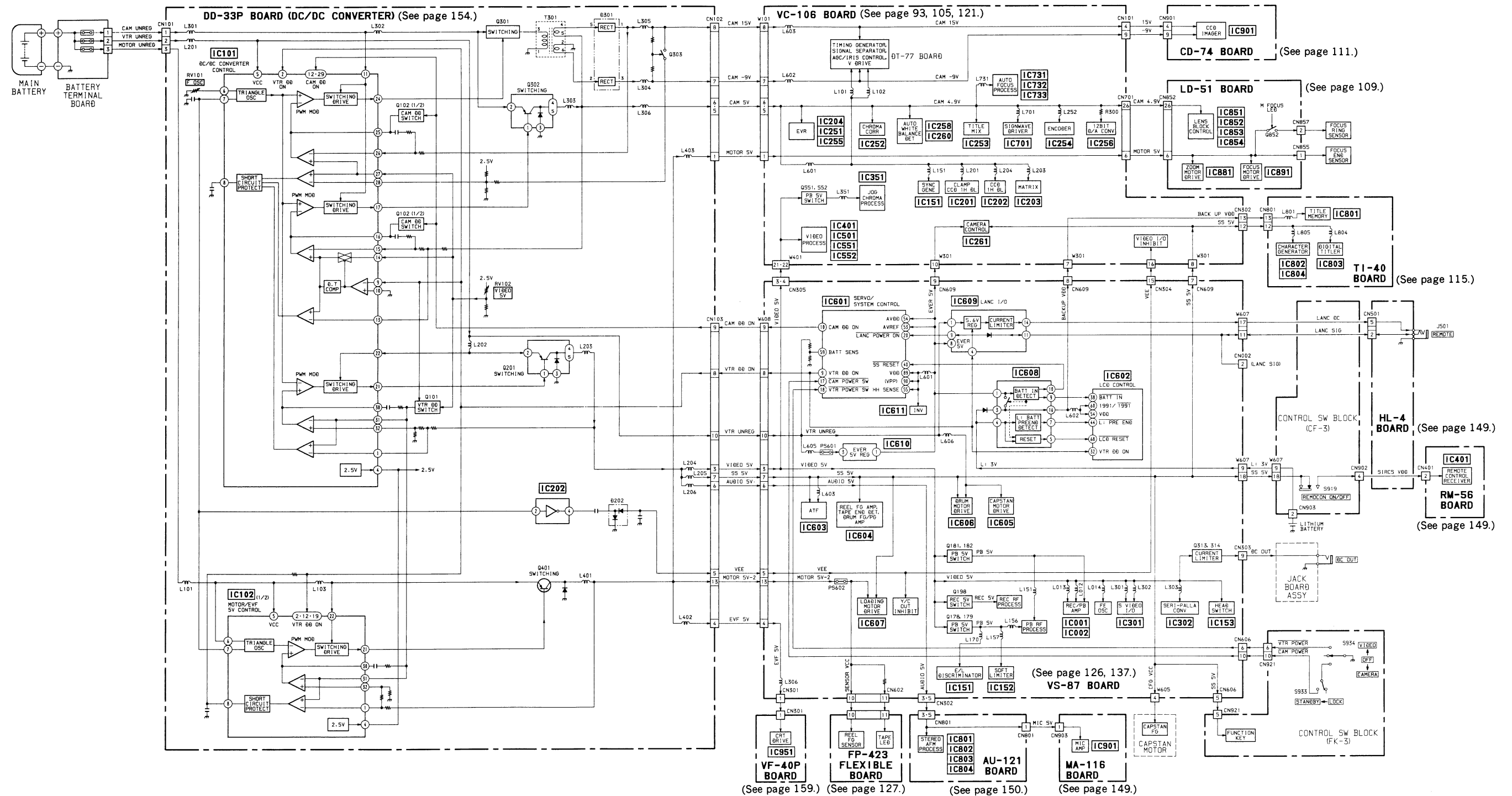
MC-Service



3-13. VIEWFINDER BLOCK DIAGRAM



3-14. POWER BLOCK DIAGRAM



SECTION 4 PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

THIS NOTE IS COMMON FOR PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS.
(In addition to this, the necessary note is printed in each block.)

• **For printed wiring boards.**

-  : Pattern from the side which enables seeing.

(The other layers' patterns are not indicated.)

Caution:

Pattern face side:	Parts on the pattern face side seen from (Conductor Side) the pattern face are indicated.
Parts face side:	Parts on the parts face side seen from the (Component side) parts face are indicated.

• **For schematic diagrams.**

- Caution when replacing chip parts.
New parts must be attached after removal of chip.
Be careful not to heat the minuts side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, 1/8W or less unless otherwise noted.
k Ω : 1000 Ω , M Ω : 1000k Ω .
- All capacitors are in μ F unless otherwise noted. pF: μ μ F.
50V or less are not indicated except for electrolytics and tantalums.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
-  : nonflammable resistor.
-  : fusible resistor.
-  : panel designation.
- Δ : internal component.
-  : adjustment for repair. *
- — : B+ Line. *
- --- : B- Line. *
-  : IN/OUT direction of (+, -) B LINE. *
- Circled numbers refer to waveforms. *

Note: The components identified by mark  or dotted line with mark  are critical for safety.
Replace only with part number specified.

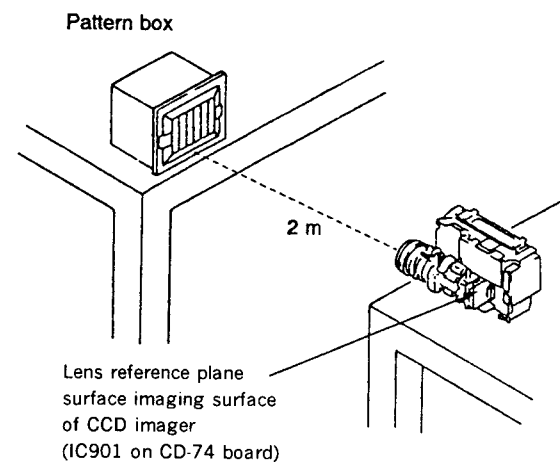
When indicating parts by reference number, please include the board name.

* indicated by the color red.

• **Measuring conditions voltage value and waveform.**
(CAMERA REC MODE)

- The object is color bar chart of pattern box. *
- Voltages are dc between ground and measurement points. *
- Readings are taken with a digital multimeter (DC 10M Ω). *
- Voltage variations may be noted due to normal production tolerances. *

1. Connection



2. Adjust the distance so that the output waveform of Fig. a and the Fig. b can be obtain.

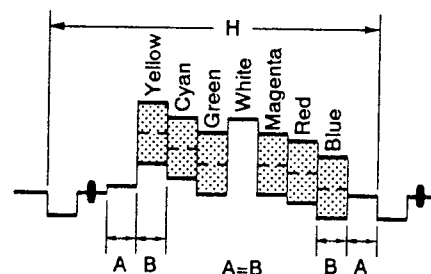


Fig. a (Video output terminal output waveform)

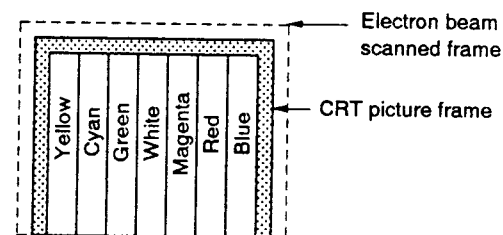


Fig. b (Picture on monitor TV)

(VTR REC or VTR PB mode)

- Voltages are dc between ground and measurement points. *
- Readings are taken with a color-bar signal input. *
- Readings are taken with a digital multimeter (DC10M Ω). *
- Voltage variations may be noted due to normal production tolerances. *
- The following four types of extension harness are required to measure the voltage.
 - 18P extension harness (J-6082-141-A)
(VC-106 board CN101 $\rightarrow$ CD-74 board CN901)
 - 20P extension harness (J-6082-133-A)
(VS-87 board W607 $\rightarrow$ CF block CN901)
 - 22P extension harness (J-6082-106-A)
(VC-106 board CN302 $\rightarrow$ TI-40 board CN801)
 - 32P extension harness (J-6082-142-A)
(VC-106 board CN701 $\rightarrow$ LD-51 board CN852)

Precautions for Replacement of CCD Imager Block.

- With a pair of IC901 (CCD imager) on the CD-74 complete board and IC001 (corrector ROM) on the DT-77 complete board, it is used a repair part of the CCD imager block. Since corrector ROM IC is manufactured to match the CCD imager, replacement of a single unit of the CCD imager corrector ROM cannot be allowed.
- When both a CCD imager and the corrector ROM, replace both the CCD imager and the corrector ROM, when a corrector ROM is not mounted on the service set, install a corrector ROM which is supplied anew.
- IC901 (CCD imager) is not mounted on the CD-74 complete board to be supplied as a repair part, and IC001 (corrector ROM) is not mounted on the DT-77 complete board to be supplied as a repair part. When the respective boards are replaced, remove the respective ICs from the old boards and install them to the new once respectively.
- After the CCD imager block has been replaced, perform the entire adjustments of the camera section.
- CCD imager is structurally in case of being broken down by static electricity.
For this reason, take care to handle it as well as MOS IC. Moreover, care should be taken for dust not to be stuck on the light reseiving section and for strong light not to get into there.

VTR Recording Procedure for AEP, UK Model.

1. Insert the adjustment remote control RM-95 (J-6082-053-B) into the REMOTE jack.
2. Set the adjustment remote control to HOLD ON.
3. Select adjustment page 4, adjustment address C1 and adjustment data 41, and select adjustment page 4, adjustment address 29 and adjustment data 6 with the adjustment remote control. (When the power is turned OFF, the system will return to the original state.)
4. Select adjustment page 0, adjustment address 01 and adjustment data 01 with the adjustment remote control.
5. Select adjustment page D, adjustment address 05 and adjustment data 91 with the adjustment remote control.
6. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
7. Set the adjustment remote control to HOLD OFF.
(Now, VTR recording can be started.)

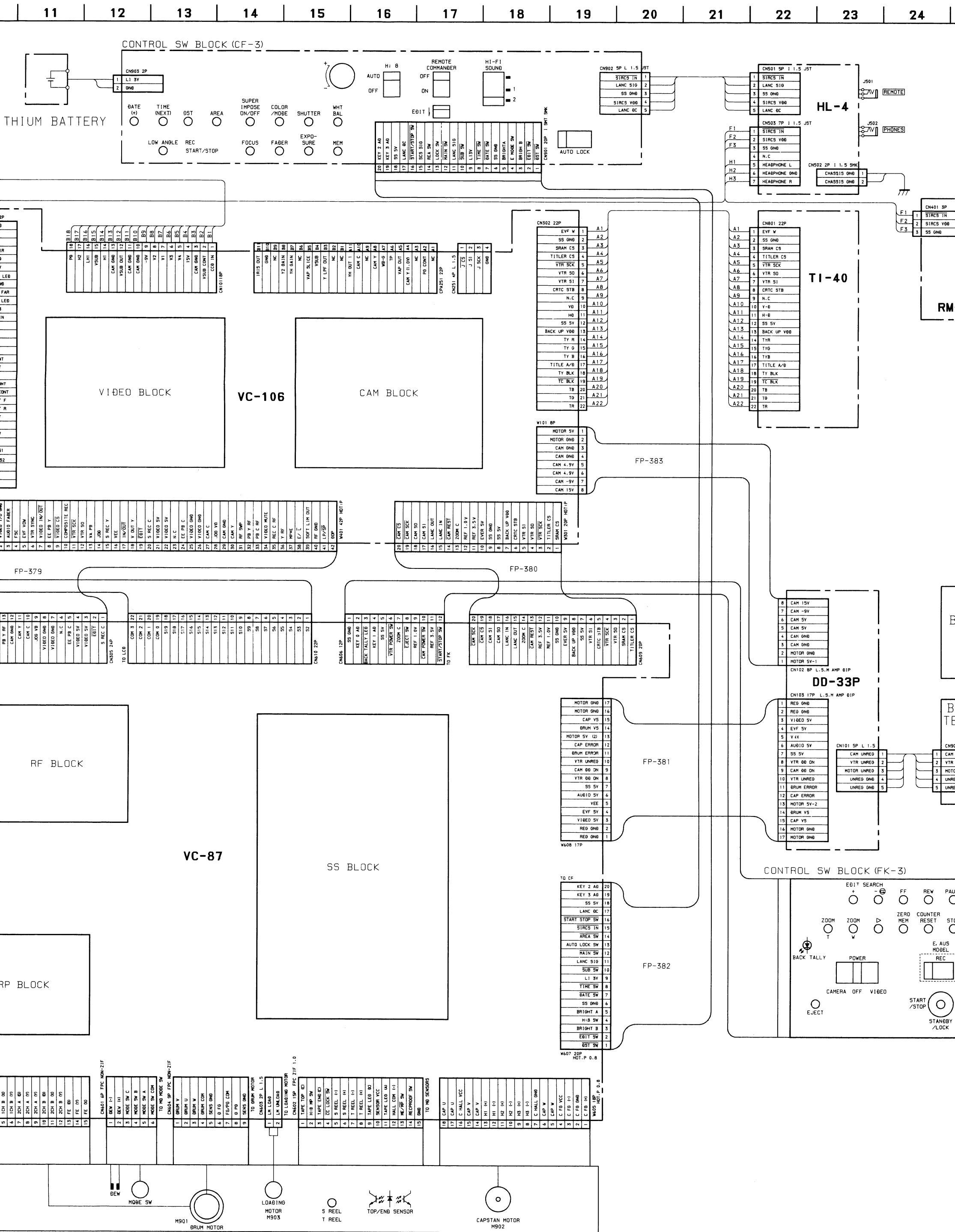
Note 1 : After recording has been done, be sure to turn the power OFF and then ON again to play back the record.

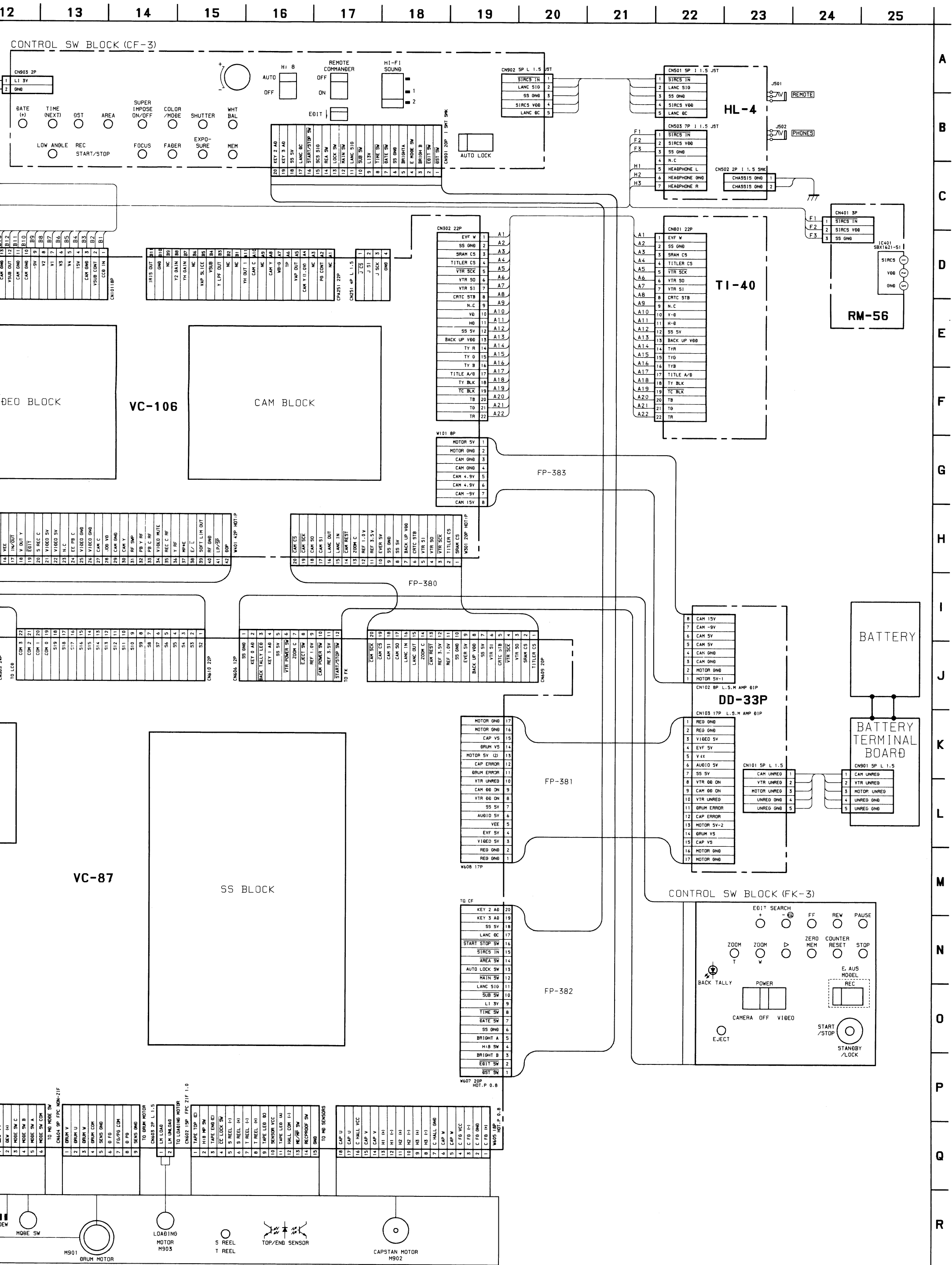
Note 2 : To clear REC mode, perform the above items 1, 2, 4, 5, 6 and 8. In this procedure, the adjustment data for item 6 should be set to 90.

Note 3 : When the data on page 4 has been changed, the SP/LP changeover and other switches will not be in force. Therefore, switch to a necessary mode before setting up necessary data.

The diagram illustrates the internal wiring and connections of a video recording system. Key components and their connections include:

- LCD:** Displays time (88:88:88), counter (ZERO MEM), and various status indicators (H, PM, AM, B, G, S, R, L, M, F, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z).
- LITHIUM BATTERY:** Provides power to the system.
- CONTROL SW BLOCK (CF-3):** Includes buttons for DATE, TIME, NEXT, BKT, AREA, SUPER IMPOSE ON/OFF, LOW ANGLE, REC START/STOP, and FOCUS.
- CD-74:** A central control unit with multiple pin headers (CN901, CN701, CN101, CN102, CN103, CN104, CN105, CN106, CN107, CN108, CN109, CN110, CN111, CN112, CN113, CN114, CN115, CN116, CN117, CN118, CN119, CN120, CN121, CN122, CN123, CN124, CN125, CN126, CN127, CN128, CN129, CN130, CN131, CN132, CN133, CN134, CN135, CN136, CN137, CN138, CN139, CN140, CN141, CN142, CN143, CN144, CN145, CN146, CN147, CN148, CN149, CN150, CN151, CN152, CN153, CN154, CN155, CN156, CN157, CN158, CN159, CN160, CN161, CN162, CN163, CN164, CN165, CN166, CN167, CN168, CN169, CN170, CN171, CN172, CN173, CN174, CN175, CN176, CN177, CN178, CN179, CN180, CN181, CN182, CN183, CN184, CN185, CN186, CN187, CN188, CN189, CN190, CN191, CN192, CN193, CN194, CN195, CN196, CN197, CN198, CN199, CN200, CN201, CN202, CN203, CN204, CN205, CN206, CN207, CN208, CN209, CN210, CN211, CN212, CN213, CN214, CN215, CN216, CN217, CN218, CN219, CN220, CN221, CN222, CN223, CN224, CN225, CN226, CN227, CN228, CN229, CN230, CN231, CN232, 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4-2. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

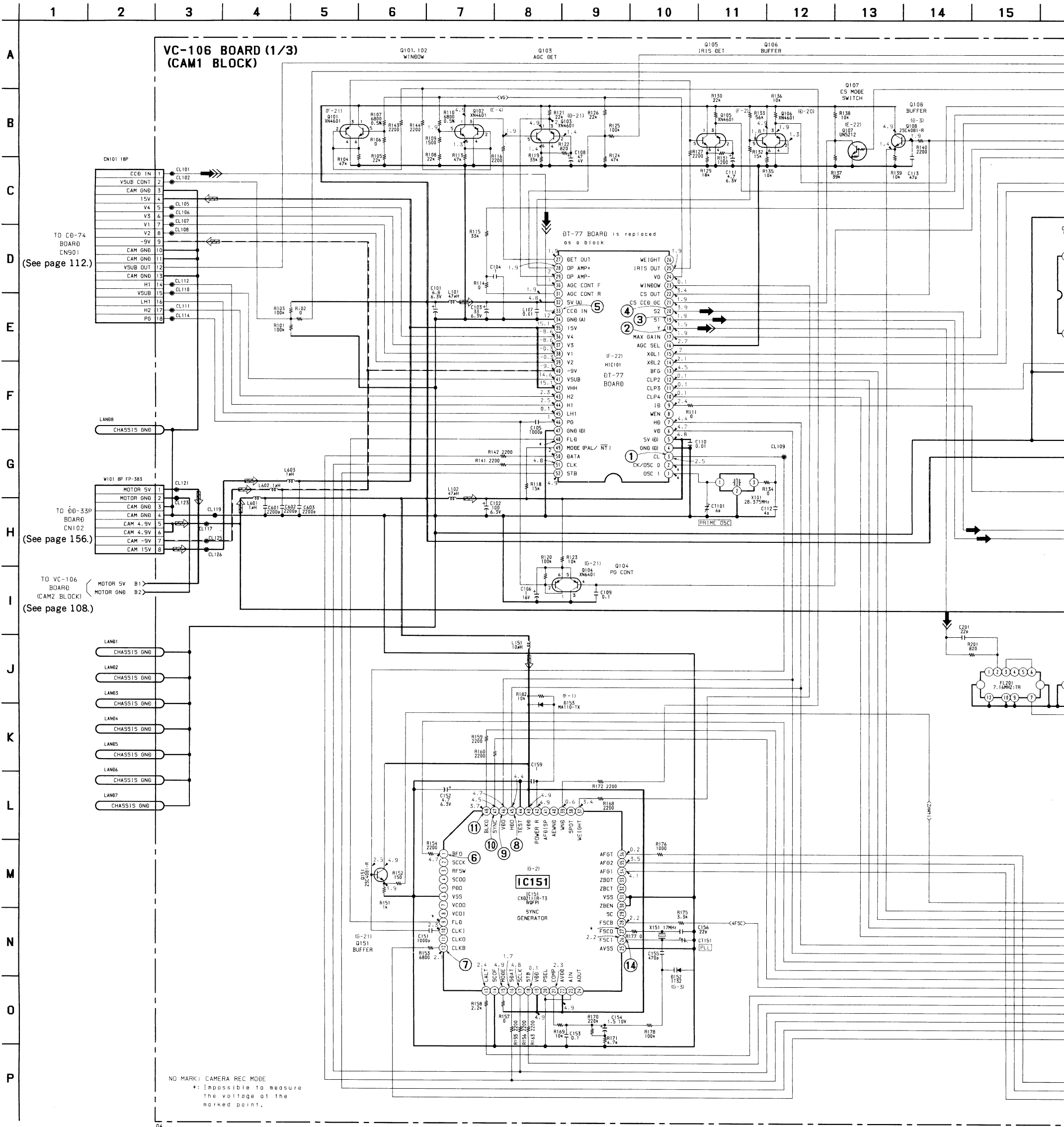
VC-106 (CAMERA) SCHEMATIC DIAGRAM

—Ref. No. VC-106 BOARD : 1000 series—

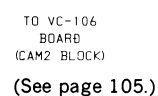
Be sure to always read "Precautions for replacement of CCD imager block" in page 88 when replacing the CD-74 board, complete, DT-77 board, complete and CCD imager block (IC901 on the CD-74 board and IC001 on the DT-77 board).

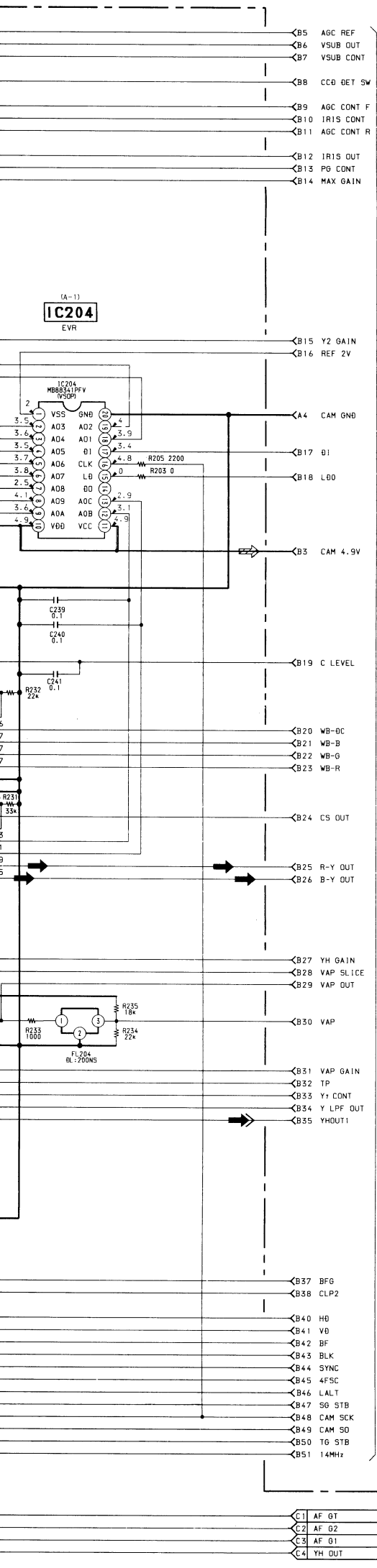
• Signal path

	VIDEO Signal		
	CHROMA	Y	Y/CHROMA
REC	➡	➡➡	➡➡➡
PB			

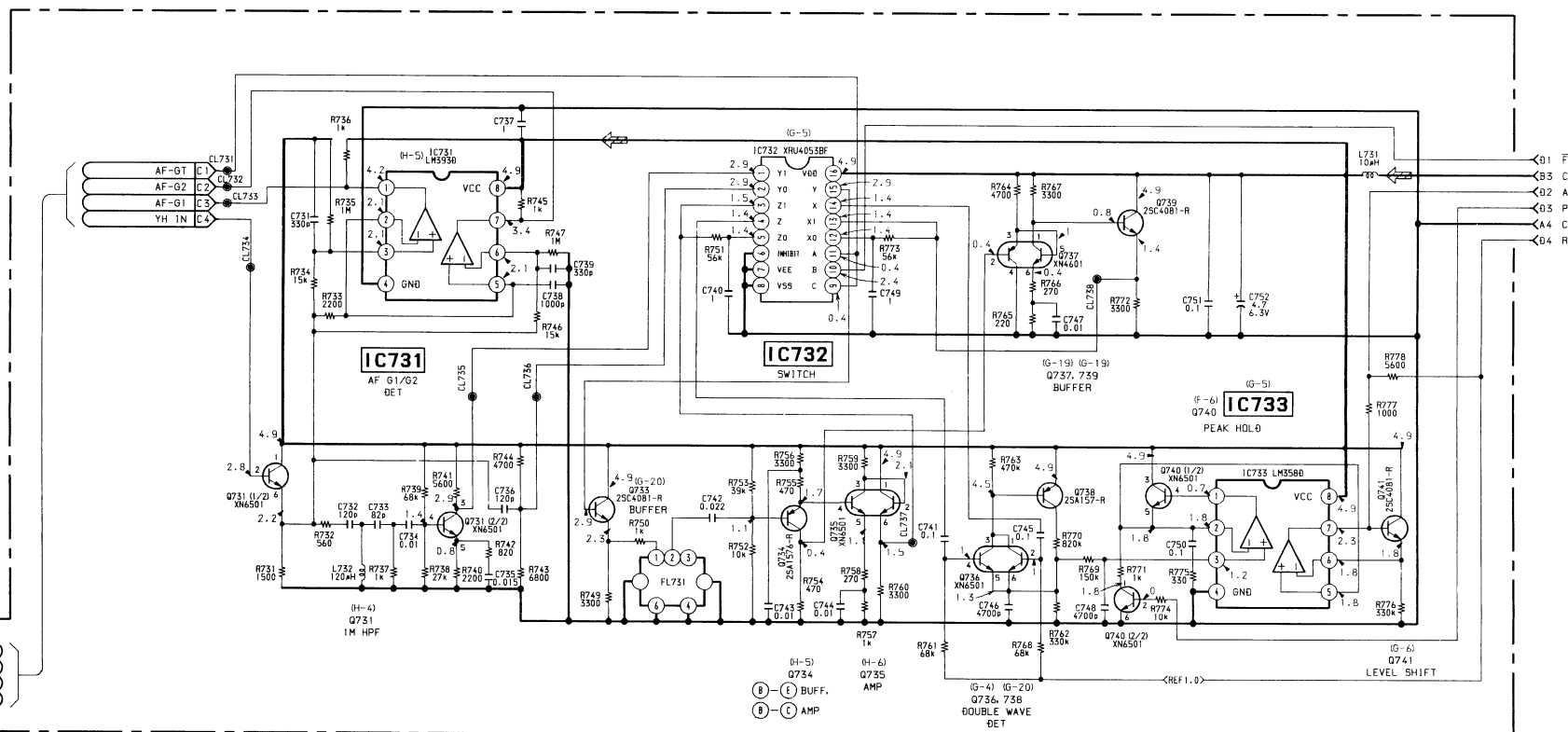
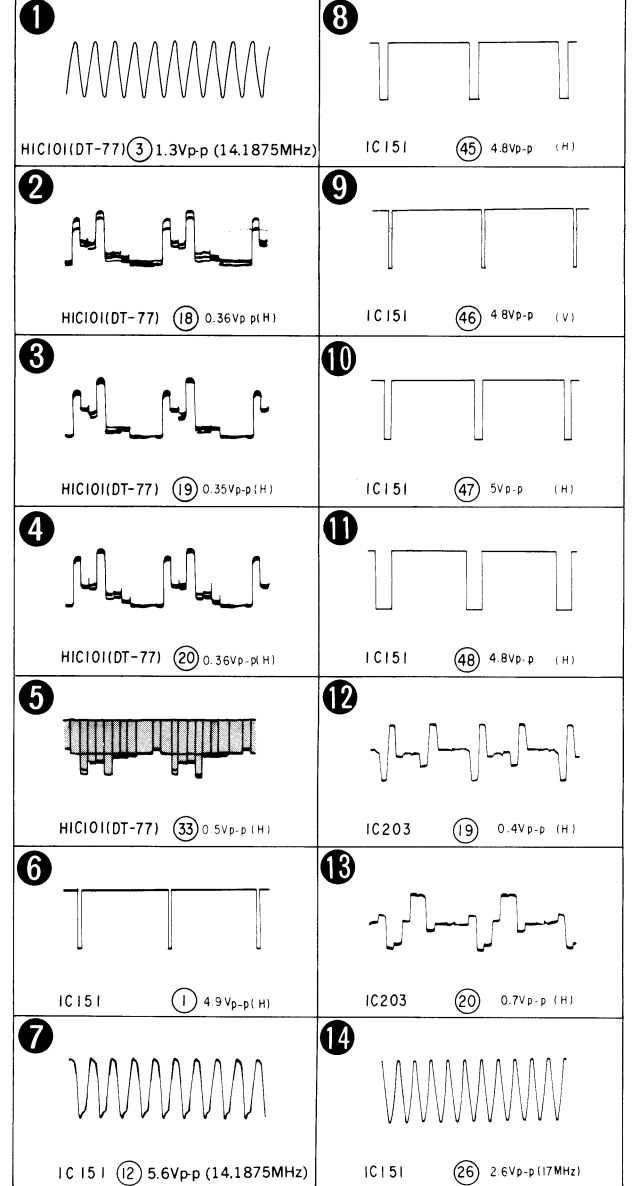


	VIDEO Signal		
	CHROMA	Y	Y/CHROMA
REC	➡	➡➡	➡➡➡
PB			

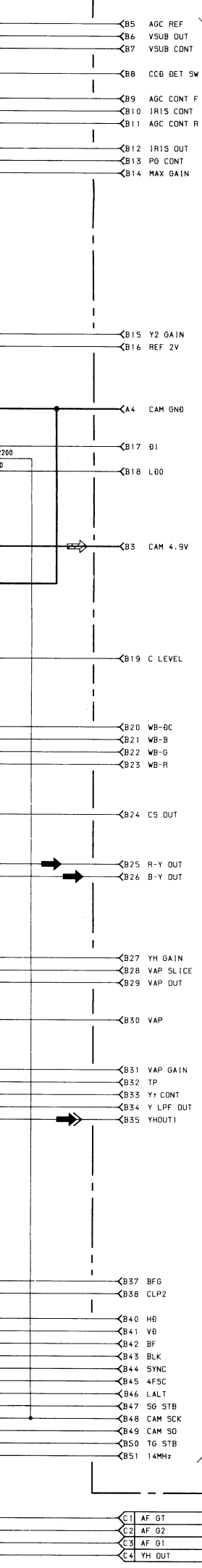




VC-106 BOARD (CAMERA REC MODE)

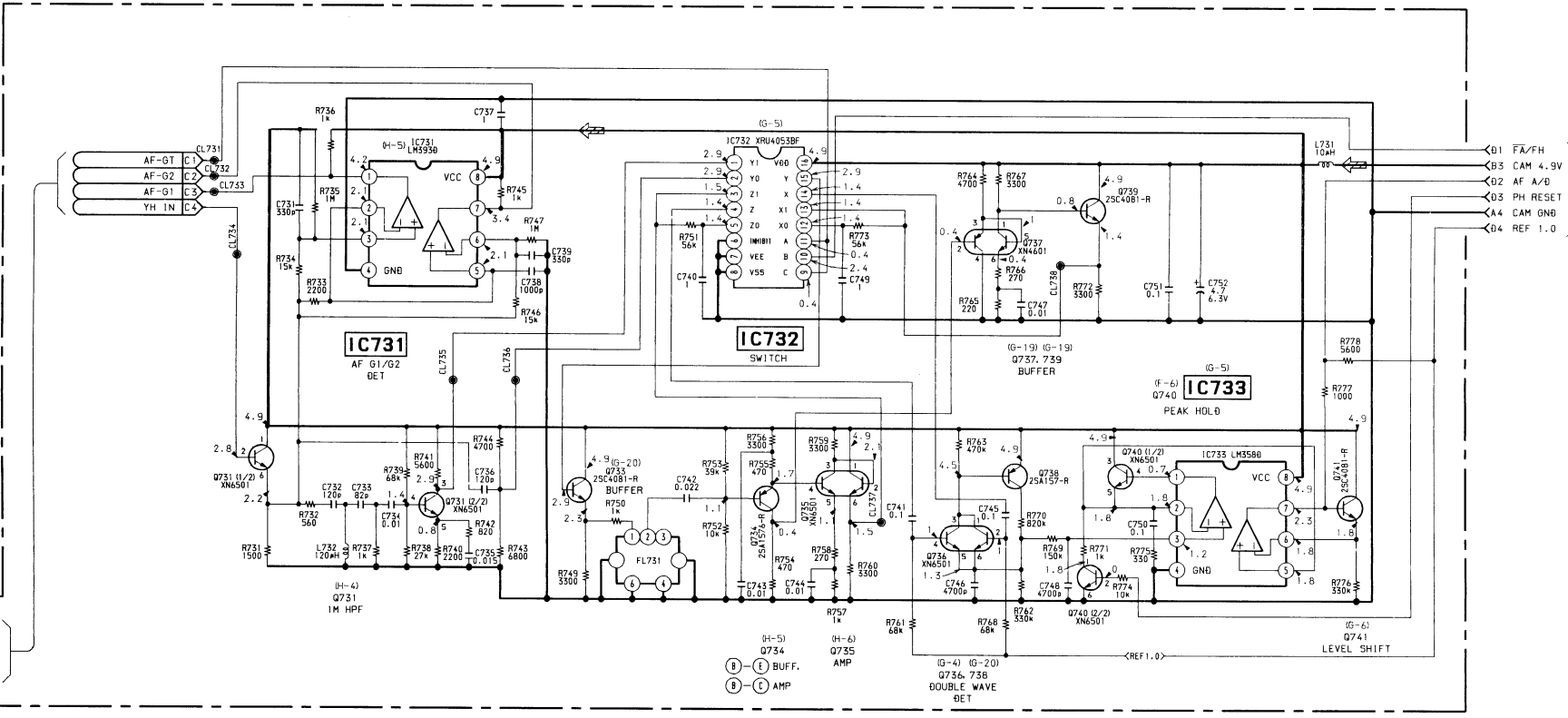
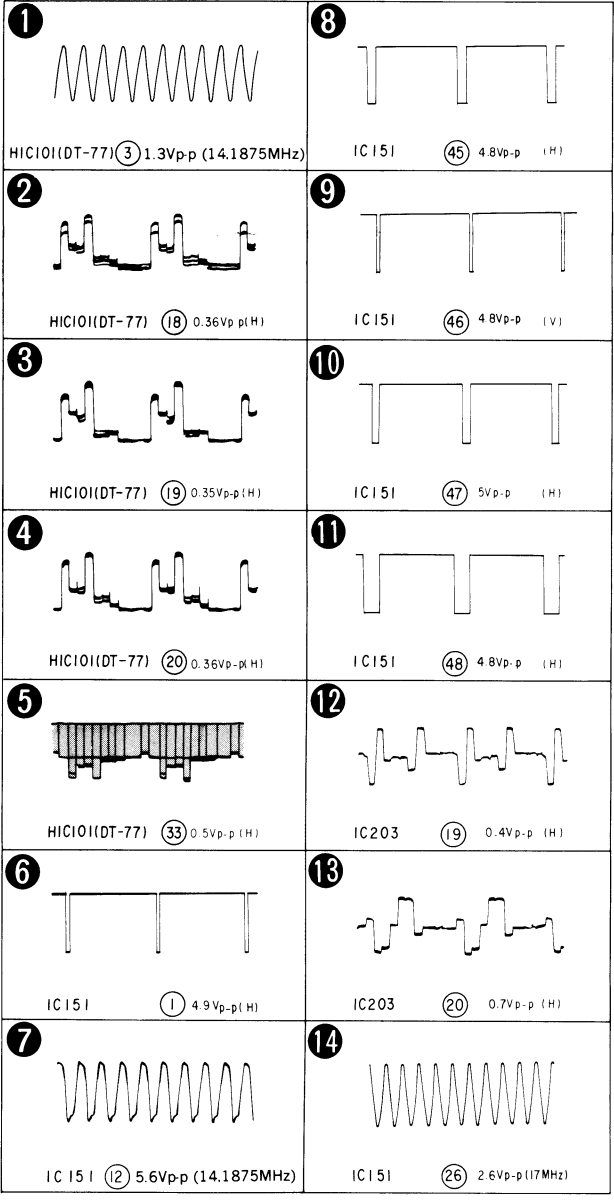


4 25 26 27 28 29 30 31 32 33 34 35 36 37



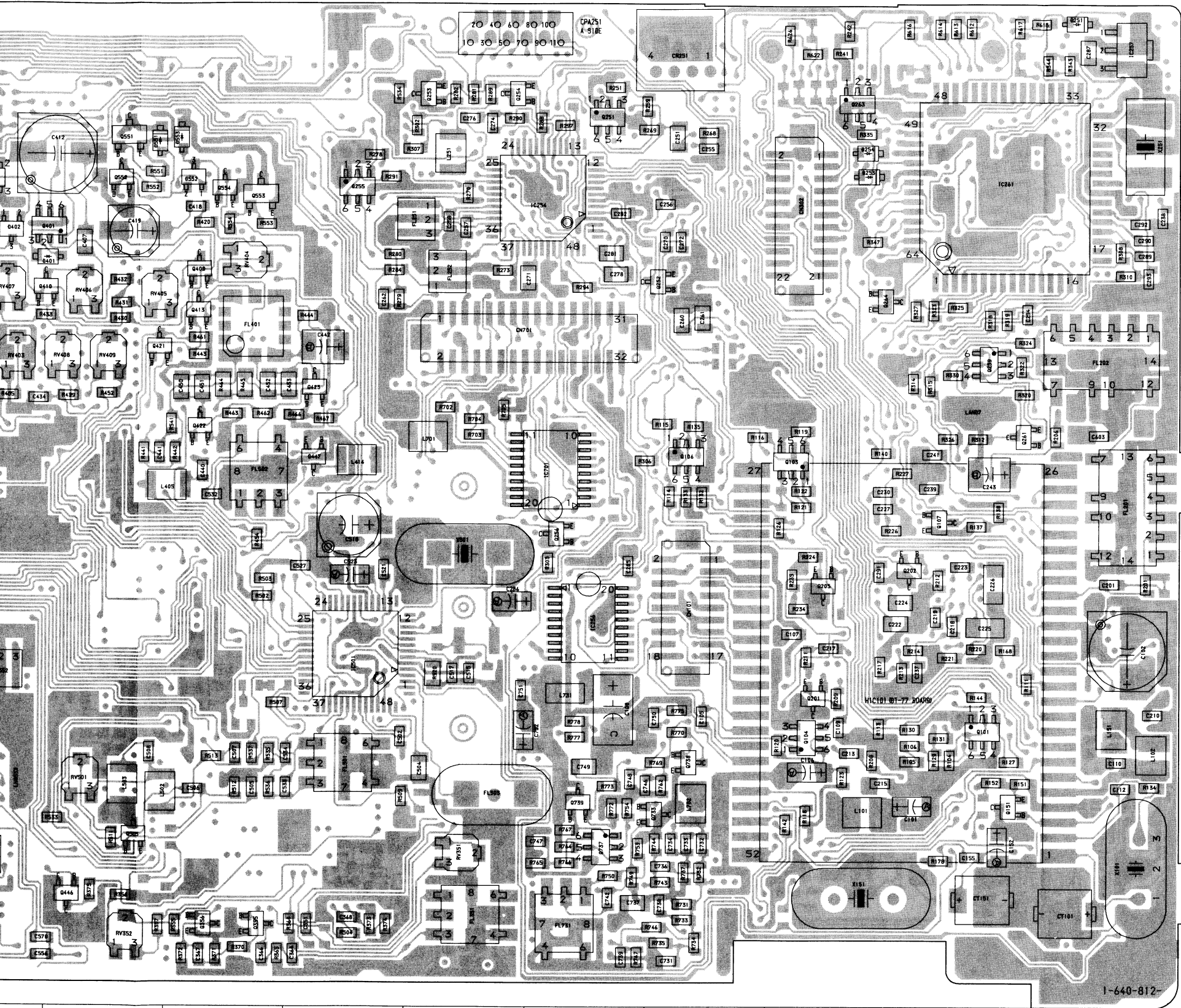
TO VC-106 BOARD (CAM2 BLOCK)
(See page 105.)

VC-106 BOARD (CAMERA REC MODE)



TO VC-106 BOARD (CAM2 BLOCK)
(See page 108.)

BOARD (COMPONENT SIDE)



< DIODE >

D152	8-719-949-46	1T32
D153	8-719-404-46	MA110
D251	8-719-404-46	MA110
D253	8-719-404-46	MA110
D254	8-719-404-46	MA110
D351	8-719-404-46	MA110
D401	8-719-421-03	MA732

D402

D402	8-719-404-35	MA141WK
D403	8-719-820-05	1SS181
D404	8-719-820-05	1SS181
D405	8-719-404-35	MA141WK
D406	8-719-404-46	MA110
D551	8-719-404-46	MA110
D552	8-719-404-35	MA141WK
D553	8-719-404-46	MA110

< HIC >

HIC101 A-7068-194-A DT-77 BOARD, COMPLETE

< IC >

IC151	8-752-339-77	CXD2111R-T3
IC201	8-752-340-34	CXL1507AN
IC202	8-752-332-69	CXL5504M
IC203	8-752-038-97	CXA1391R
IC204	8-759-946-00	MB88341PFV

IC251	8-759-946-00	MB88341PFV
IC252	8-752-056-04	CXA1609N
IC253	8-752-039-49	CXA1393AN
IC254	8-752-057-59	CXA1592R
IC255	8-759-521-09	MB88346APFV
IC256	8-759-512-59	MB88352PFV
IC257	8-759-937-56	S-8054ALB-LM-S
IC258	8-759-008-67	MC14066BF
IC260	8-759-998-96	LM324D
IC261	8-759-044-05	MC68HC11L6FUSC400607
IC351	8-759-605-61	CXA1203N
IC401	8-752-036-19	CXA1207AR
IC501	8-752-036-20	CXA1208R
IC551	8-752-333-24	CXL1506M
IC552	8-752-333-24	CXL1506M
IC701	8-752-348-74	CXD2104AN
IC731	8-759-998-92	LM393D
IC732	8-759-509-17	XRU40538F
IC733	8-759-998-98	LM358D

< TRANSISTOR >

Q101	8-729-907-46	1M21
Q102	8-729-907-46	1M21
Q103	8-729-907-46	1M21
Q104	8-729-925-42	1M22
Q105	8-729-907-46	1M21
Q106	8-729-907-46	1M21
Q107	8-729-402-45	UN5212
Q108	8-729-905-35	2SC4081-R
Q151	8-729-905-35	2SC4081-R
Q201	8-729-905-23	2SA1576-R
Q202	8-729-905-23	2SA1576-R
Q203	8-729-925-42	1M22
Q204	8-729-905-23	2SA1576-R
Q205	8-729-905-23	2SA1576-R
Q251	8-729-907-46	1M21
Q252	8-729-905-18	DTC144EU
Q253	8-729-905-23	2SA1576-R
Q254	8-729-905-35	2SC4081-R
Q255	8-729-907-46	1M21
Q256	8-729-905-23	2SA1576-R
Q259	8-729-925-39	1M28
Q260	8-729-925-42	1M22
Q261	8-729-420-50	UN5215
Q262	8-729-905-35	2SC4081-R
Q263	8-729-925-39	1M28
Q264	8-729-420-50	UN5215
Q351	8-729-905-12	DTA144EU
Q352	8-729-905-18	DTC144EU
Q353	8-729-905-35	2SC4081-R
Q354	8-729-905-35	2SC4081-R
Q355	8-729-905-35	2SC4081-R
Q356	8-729-905-18	DTC144EU
Q401	8-729-920-48	1M22
Q402	8-729-907-39	1M22
Q403	8-729-905-23	2SA1576-R
Q404	8-729-905-18	DTC144EU
Q405	8-729-824-05	3SK248
Q406	8-729-905-18	DTC144EU
Q408	8-729-905-12	DTA144EU
Q409	8-729-824-02	2SA1838-TL
Q410	8-729-905-12	DTA144EU
Q411	8-729-403-06	KN1113
Q412	8-729-905-18	DTC144EU
Q413	8-729-905-18	DTC144EU
Q414	8-729-423-52	2SC3931

Q415	8-729-824-02	2SA1838
Q416	8-729-905-18	DTC144EU
Q417	8-729-905-35	2SC4081-R
Q418	8-729-905-23	2SA1576-R
Q419	8-729-905-23	2SA1576-R
Q420	8-729-905-35	2SC4081-R
Q421	8-729-905-18	DTC144EU
Q422	8-729-823-16	2SC4555-5.6.7
Q423	8-729-823-16	2SC4555-5.6.7
Q424	8-729-905-18	DTC144EU
Q425	8-729-905-18	DTC144EU
Q426	8-729-905-12	DTA144EU
Q427	8-729-905-18	DTC144EU
Q428	8-729-905-18	DTC144EU
Q429	8-729-905-18	DTC144EU
Q430	8-729-423-52	2SC3931
Q431	8-729-423-52	2SC3931
Q432	8-729-907-26	1M21
Q433	8-729-905-35	2SC4081-R
Q434	8-729-905-35	2SC4081-R
Q435	8-729-905-12	DTA144EU
Q437	8-729-403-06	KN1113
Q438	8-729-423-52	2SC3931
Q439	8-729-920-99	DTA114EU
Q440	8-729-905-23	2SA1576-R
Q441	8-729-403-06	KN1113
Q442	8-729-403-07	KN1213
Q443	8-729-905-18	DTC144EU
Q444	8-729-905-18	DTC144EU
Q446	8-729-905-18	DTC144EU
Q447	8-729-905-18	DTC144EU
Q501	8-729-905-35	2SC4081-R
Q502	8-729-905-35	2SC4081-R
Q505	8-729-905-23	2SA1576-R
Q506	8-729-905-35	2SC4081-R
Q507	8-729-905-35	2SC4081-R
Q508	8-729-905-35	2SC4081-R
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Q513	8-729-905-18	DTC144EU
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Q551	8-729-807-87	2SB1295-UL6
Q552	8-729-905-18	DTC144EU
Q553	8-729-807-87	2SB1295-UL6
Q554	8-729-905-18	DTC144EU
Q555	8-729-905-23	2SA1576-R
Q556	8-729-905-35	2SC4081-R
Q557	8-729-905-35	2SC4081-R
Q558	8-729-905-18	DTC144EU
Q559	8-729-905-23	2SA1576-R
Q560	8-729-905-35	2SC4081-R
Q701	8-729-907-46	1M21
Q731	8-729-920-59	1M22
Q733	8-729-905-35	2SC4081-R
Q734	8-729-905-23	2SA1576-R
Q735	8-729-920-59	1M22
Q736	8-729-920-59	1M22
Q737	8-729-907-46	1M21
Q738	8-729-905-23	2SA1576-R
Q739	8-729-905-35	2SC4081-R
Q740	8-729-920-59	1M22
Q741	8-729-905-35	2SC4081-R

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D251 8-719-404-46 MA110
D253 8-719-404-46 MA110
D254 8-719-404-46 MA110
D351 8-719-404-46 MA110
D401 8-719-421-03 MA732
D402 8-719-404-35 MA141WK
D403 8-719-820-05 1SS181
D404 8-719-820-05 1SS181
D405 8-719-404-35 MA141WK
D406 8-719-404-46 MA110
D551 8-719-404-46 MA110
D552 8-719-404-35 MA141WK
D553 8-719-404-46 MA110

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HIC101 A-7068-194-A DT-77 BOARD, COMPLETE

< IC >

IC151 8-752-339-77 CXD2111R-T3
IC201 8-752-340-34 CXL1507AN
IC202 8-752-332-69 CXL5504M
IC203 8-752-038-97 CXA1391R
IC204 8-759-946-00 MB88341PFV
IC251 8-759-946-00 MB88341PFV
IC252 8-752-056-04 CXA1609N
IC253 8-752-039-49 CXA1393AN
IC254 8-752-057-59 CXA1592R
IC255 8-759-521-09 MB88346APFV
IC256 8-759-512-59 MB88352PFV
IC257 8-759-937-56 S-8054ALB-LM-S
IC258 8-759-008-67 MC14066BF
IC260 8-759-998-96 LM324D
IC261 8-759-044-05 MC68HC11L6FUSC400607
IC351 8-759-605-61 CXA1203N
IC401 8-752-036-19 CXA1207AR
IC501 8-752-036-20 CXA1208R
IC551 8-752-333-24 CXL1506M
IC552 8-752-333-24 CXL1506M
IC701 8-752-348-74 CXD2104AN
IC731 8-759-998-92 LM393D
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IC733 8-759-998-98 LM358D

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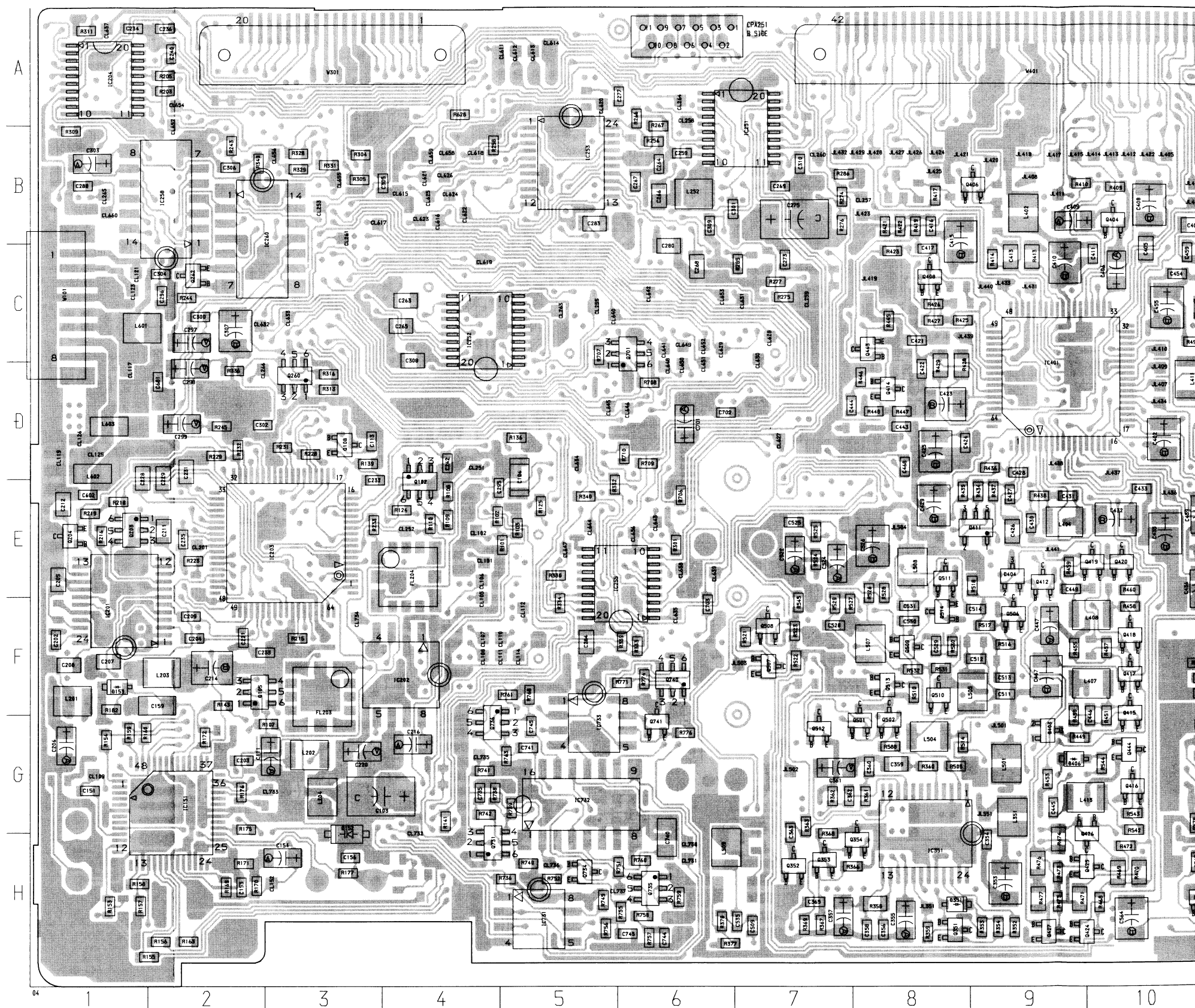
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Q103 8-729-907-46 1M21
Q104 8-729-925-42 1M22
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Q106 8-729-907-46 1M21
Q107 8-729-402-45 UN5212
Q108 8-729-905-35 2SC4081-R
Q151 8-729-905-35 2SC4081-R
Q201 8-729-905-23 2SA1576-R
Q202 8-729-905-23 2SA1576-R
Q203 8-729-925-42 1M22
Q204 8-729-905-23 2SA1576-R
Q205 8-729-905-23 2SA1576-R
Q251 8-729-907-46 1M21
Q252 8-729-905-18 DTC144EU
Q253 8-729-905-23 2SA1576-R
Q254 8-729-905-35 2SC4081-R
Q255 8-729-907-46 1M21
Q256 8-729-905-23 2SA1576-R
Q259 8-729-925-39 1M22
Q260 8-729-925-42 1M22

Q261 8-729-420-50 UN5215
Q262 8-729-905-35 2SC4081-R
Q263 8-729-925-39 1M22
Q264 8-729-420-50 UN5215
Q351 8-729-905-12 DTA144EU
Q352 8-729-905-18 DTC144EU
Q353 8-729-905-35 2SC4081-R
Q354 8-729-905-35 2SC4081-R
Q355 8-729-905-35 2SC4081-R
Q356 8-729-905-18 DTC144EU
Q401 8-729-920-48 1M22
Q402 8-729-907-39 1M22
Q403 8-729-905-23 2SA1576-R
Q404 8-729-905-18 DTC144EU
Q405 8-729-824-05 3SK248
Q406 8-729-905-18 DTC144EU
Q408 8-729-905-12 DTA144EU
Q409 8-729-824-02 2SA1838-TL
Q410 8-729-905-12 DTA144EU
Q411 8-729-403-06 XN1113
Q412 8-729-905-18 DTC144EU
Q413 8-729-905-18 DTC144EU
Q414 8-729-423-52 2SC3931
Q415 8-729-824-02 2SA1838
Q416 8-729-905-18 DTC144EU
Q417 8-729-905-35 2SC4081-R
Q418 8-729-905-23 2SA1576-R
Q419 8-729-905-23 2SA1576-R
Q420 8-729-905-35 2SC4081-R
Q421 8-729-905-18 DTC144EU
Q422 8-729-823-16 2SC4555-5.6.7
Q423 8-729-823-16 2SC4555-5.6.7
Q424 8-729-905-18 DTC144EU
Q425 8-729-905-18 DTC144EU
Q426 8-729-905-12 DTA144EU
Q427 8-729-905-18 DTC144EU
Q428 8-729-905-18 DTC144EU
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Q505 8-729-905-23 2SA1576-R
Q506 8-729-905-35 2SC4081-R
Q507 8-729-905-35 2SC4081-R
Q508 8-729-905-35 2SC4081-R
Q509 8-729-905-12 DTA144EU
Q510 8-729-423-52 2SC3931
Q511 8-729-905-18 DTC144EU
Q512 8-729-905-35 2SC4081-R
Q513 8-729-905-18 DTC144EU
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Q551 8-729-807-87 2SB1295-UL6
Q552 8-729-905-18 DTC144EU

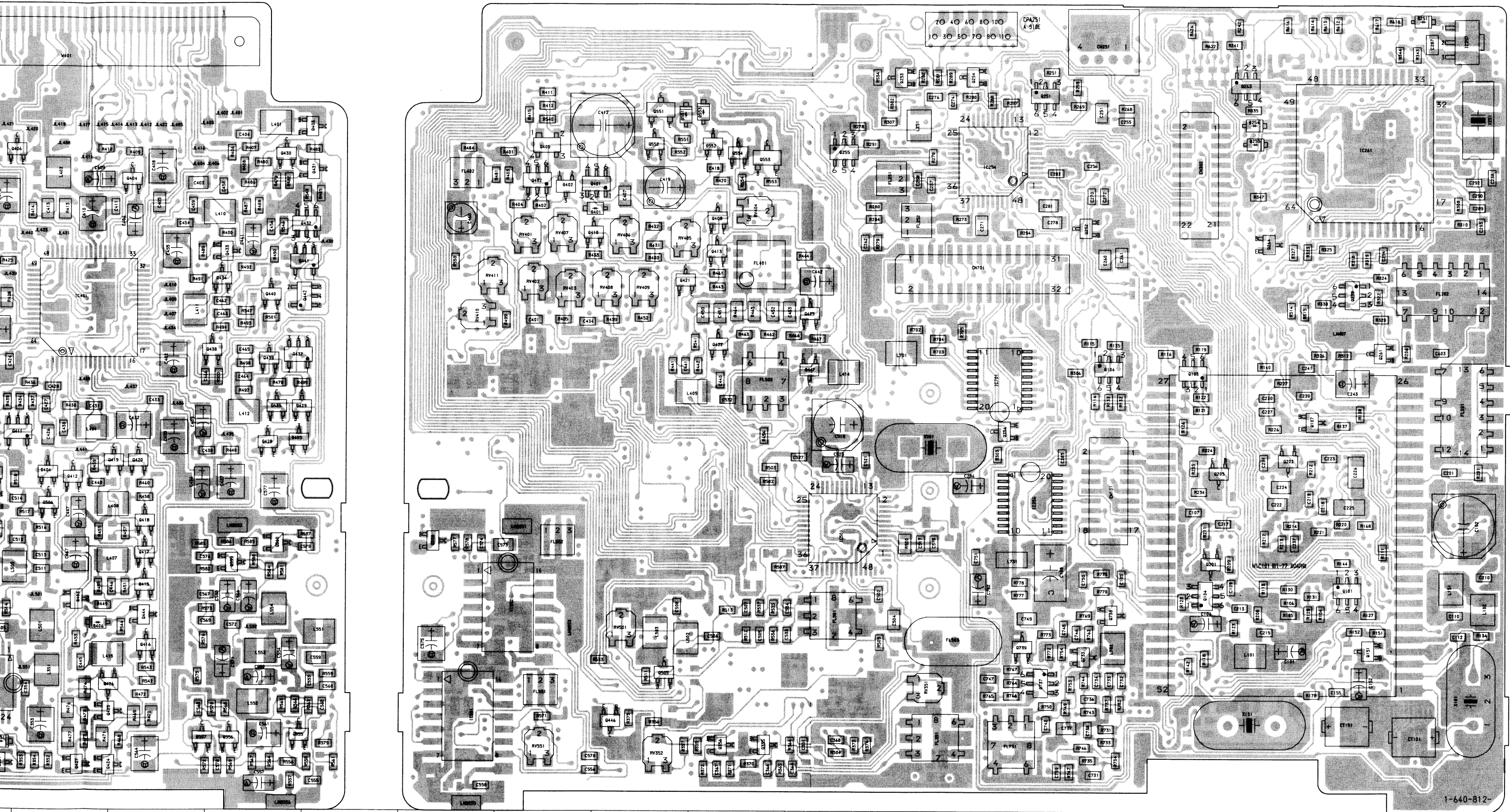
VC-106 (CAMERA) PRINTED WIRING BOARD

—Ref. No. VC-106 BOARD : 1000 series—

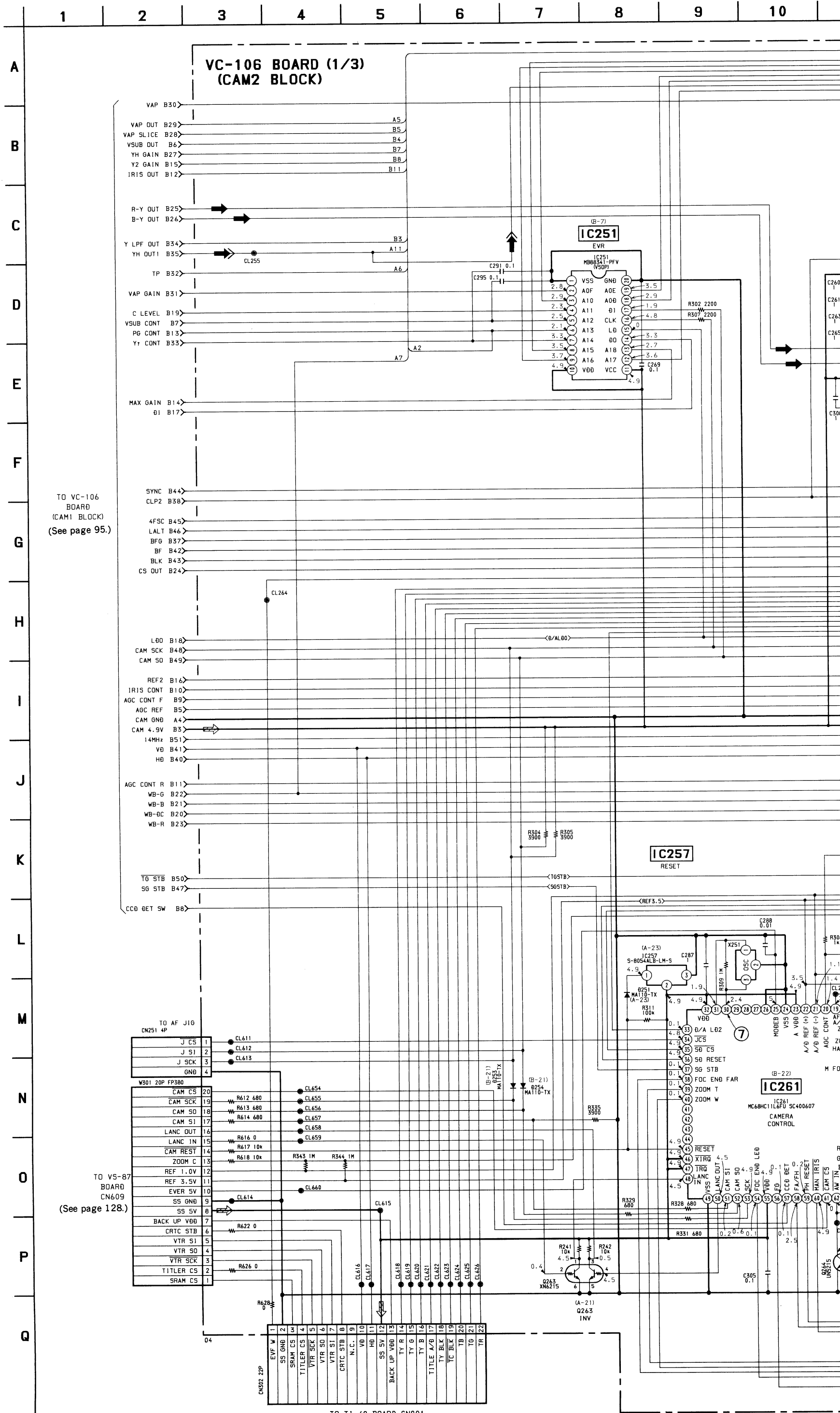
VC-106 BOARD (CONDUCTOR SIDE)



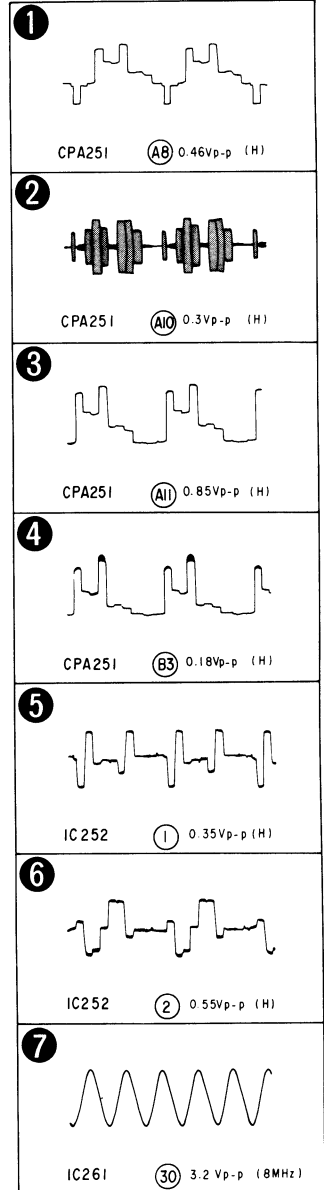
13

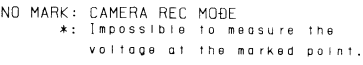


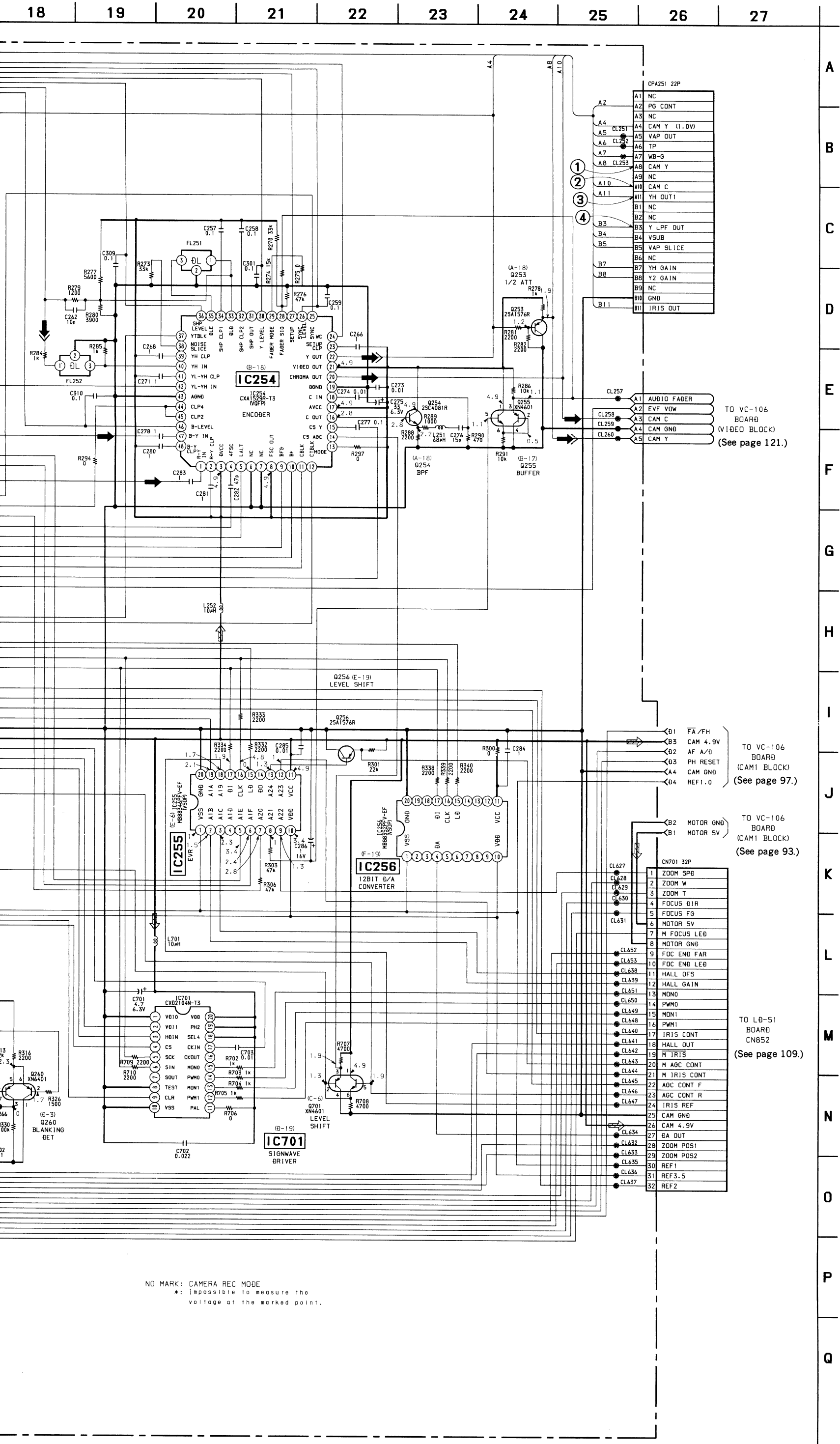
VC-106 (CAMERA) SCHEMATIC DIAGRAM
 —Ref. No. VC-106 BOARD : 1000 series—



VC-106 BOARD (CAMERA REC MODE)





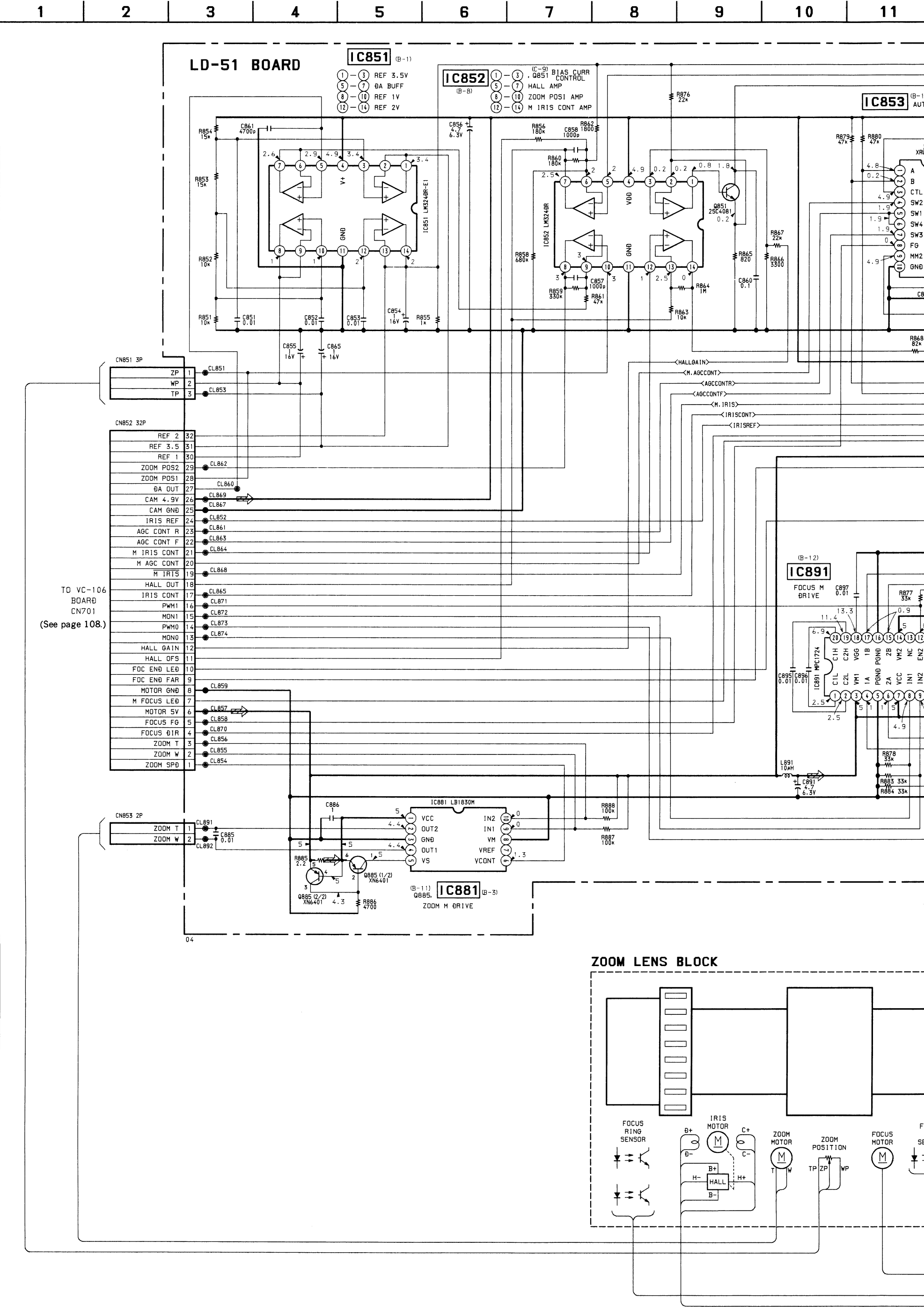


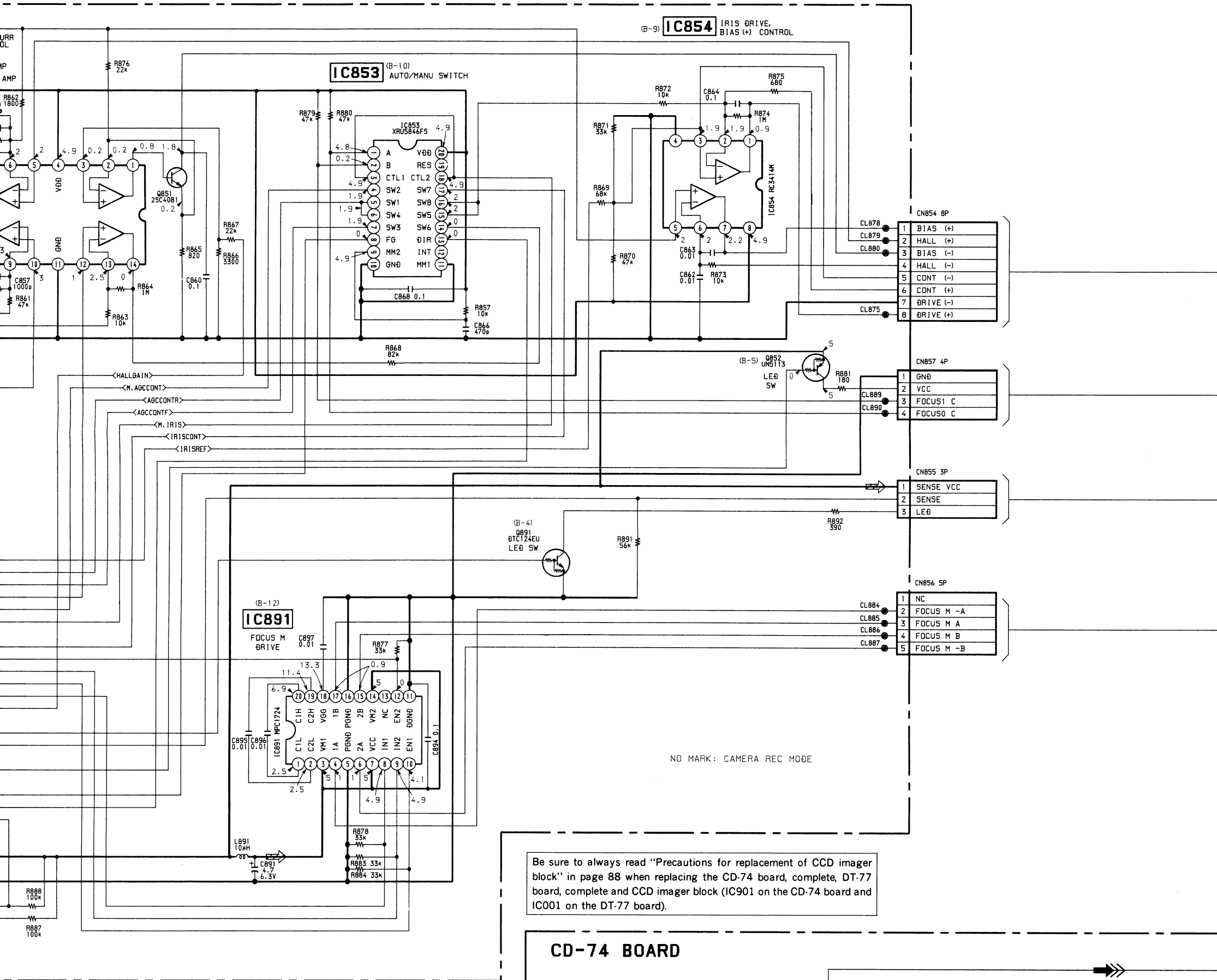
• Signal path

	VIDEO Signal		
	CHROMA	Y	Y/CHROMA
REC	➡	➡➡	➡➡➡
PB	➡	➡➡	➡➡➡

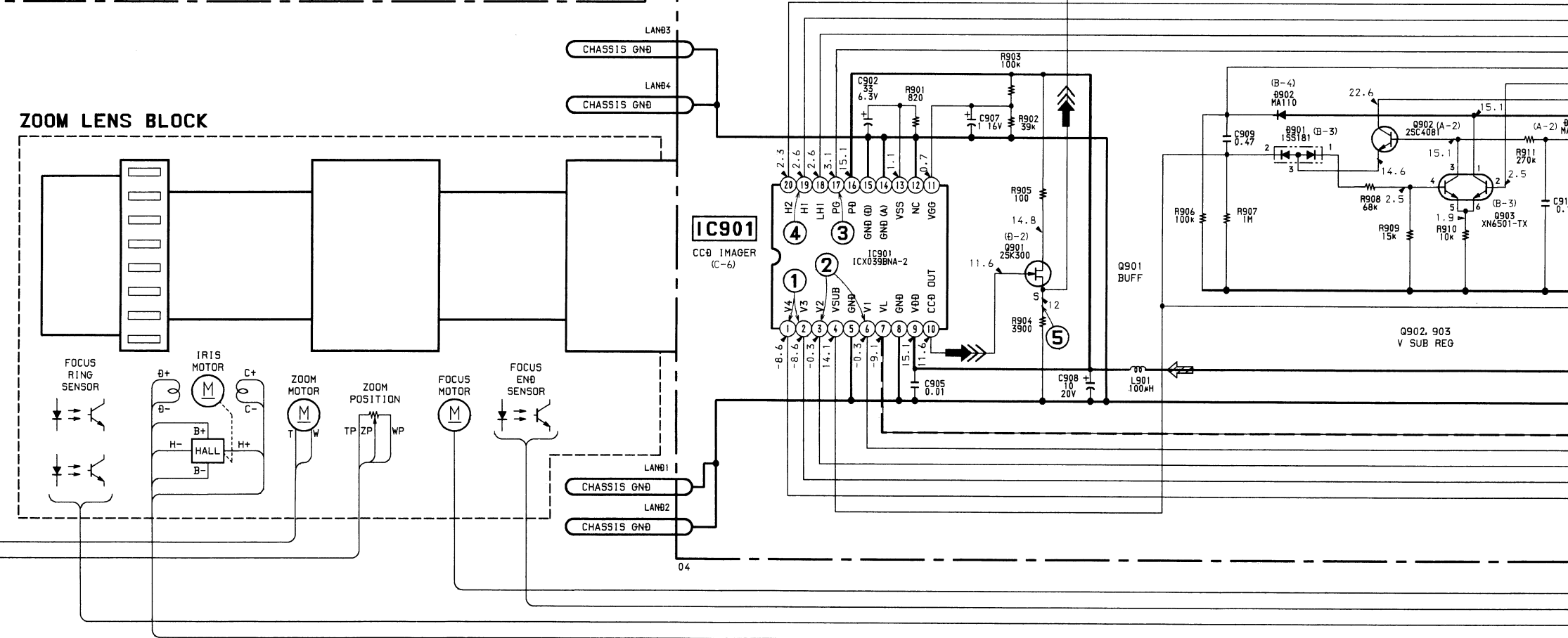
CD-74 (CCD IMAGER) LD-51 (IRIS/ZOOM/FOCUS MOTOR DRIVE) SCHEMATIC DIAGRAM

—Ref. No. CD-74 and LD-51 BOARDS : 2000 series—





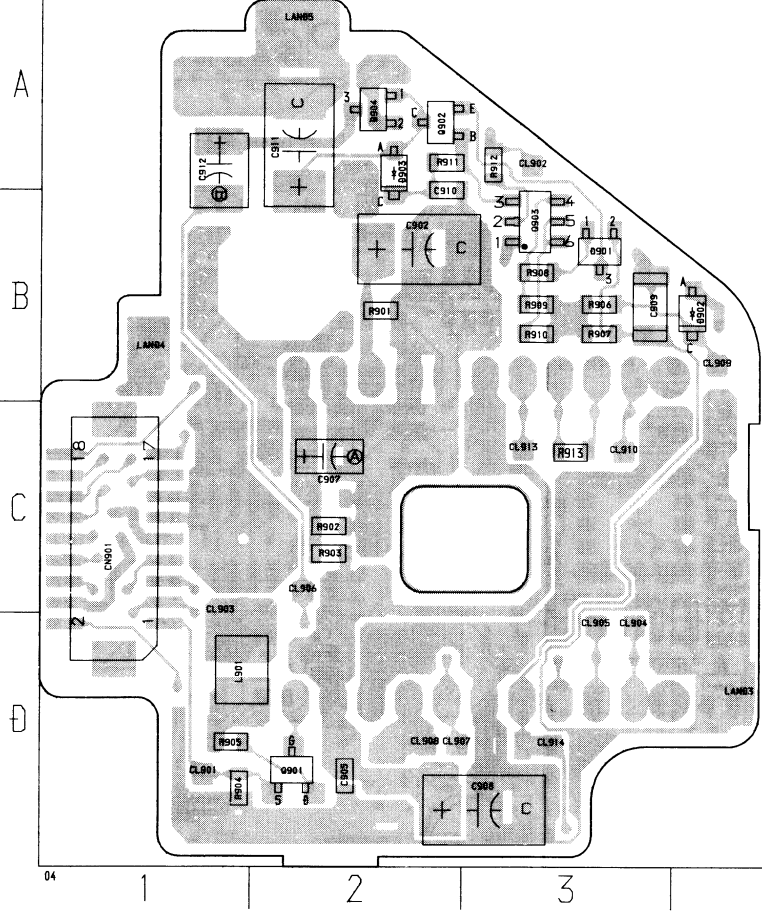
CD-74 BOARD



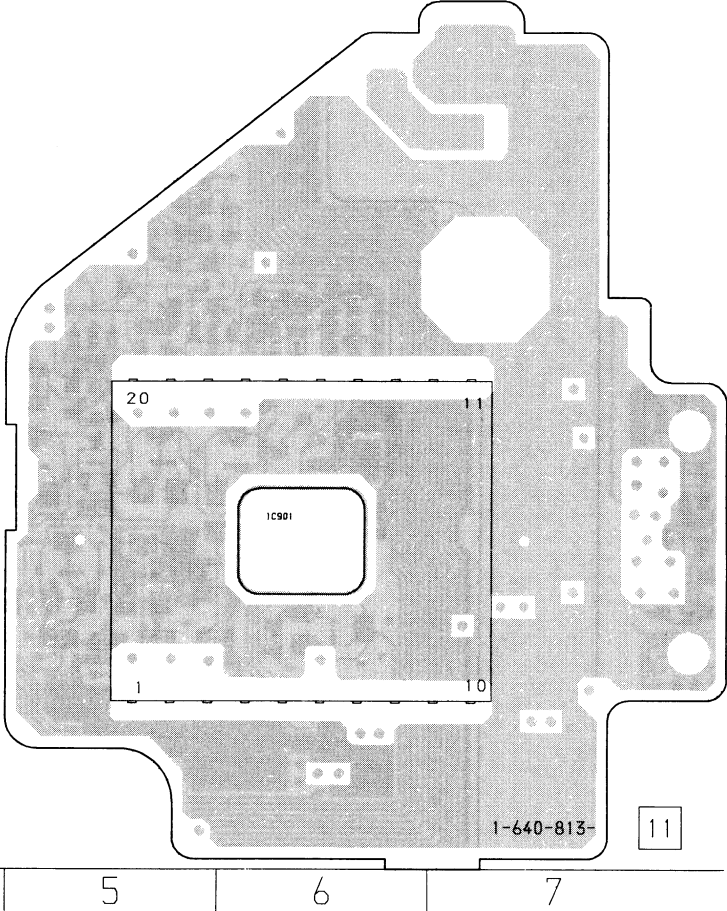
CD-74 (CCD IMAGER) LD-51 (IRIS/ZOOM/FOCUS MOTOR DRIVE) PRINTED WIRING BOARDS

—Ref. No. CD-74 and LD-51 BOARDS : 2000 series—

CD-74 BOARD (COMPONENT SIDE)



CD-74 BOARD (CONDUCTOR SIDE)



< IC >

IC851	8-759-998-96	LM324D
IC852	8-759-998-96	LM324D
IC853	8-759-513-26	XRU5846FS
IC854	8-759-981-82	RC3414M
IC881	8-759-823-51	LB1830M
IC891	8-759-038-81	MPC1724M

< TRANSISTOR >

Q851	8-729-905-35	2SC4081-R
Q852	8-729-403-35	UN5113
Q885	8-729-925-42	1MT2
Q891	8-729-905-61	DTC124EU

< DIODE >

D901	8-719-820-05	1SS181
D902	8-719-404-46	MA110
D903	8-719-404-46	MA110
D904	8-719-800-76	1SS226

< IC >

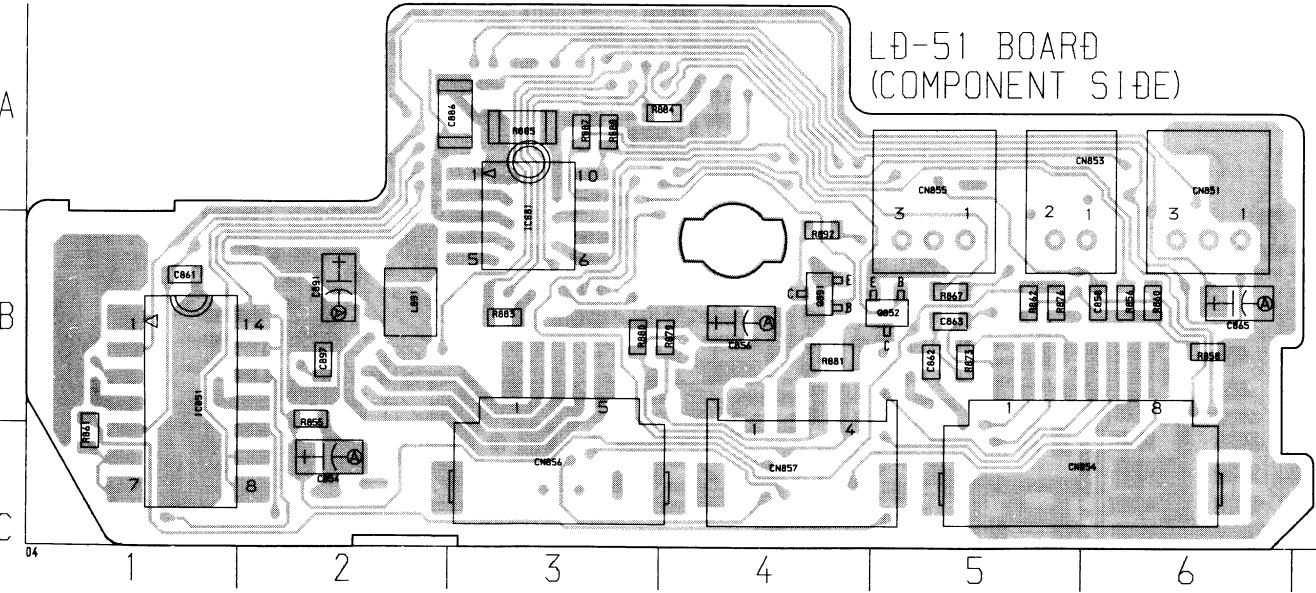
IC901	8-752-606-77	IC ICX0398NA-2
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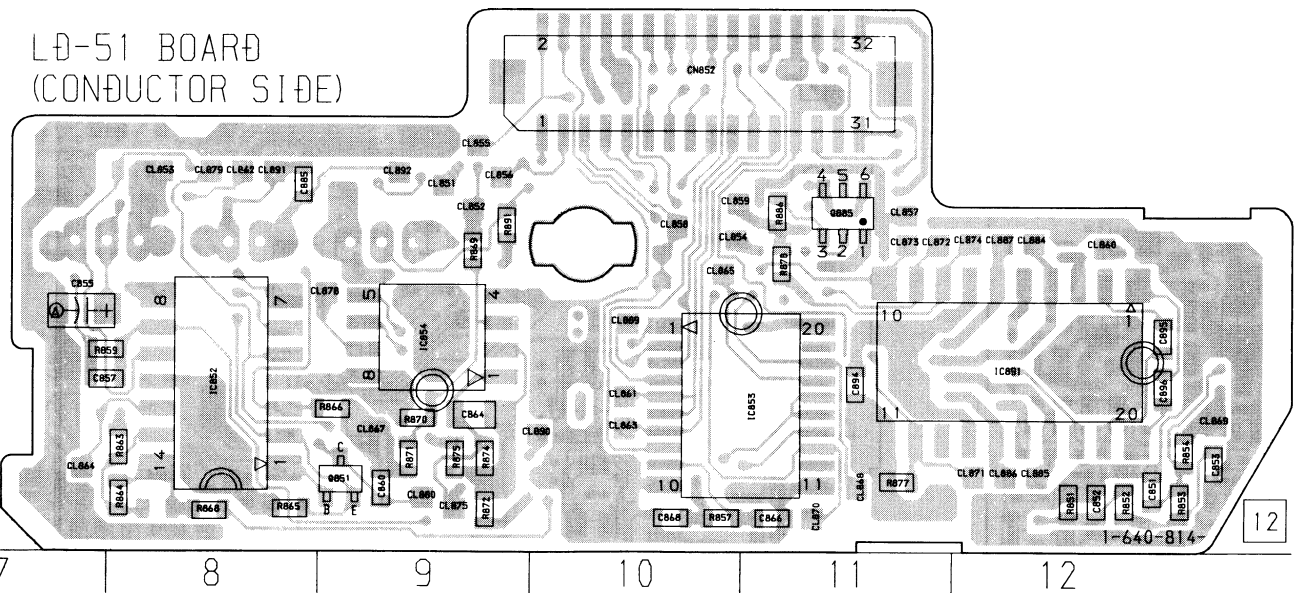
Q901	8-729-232-86	2SK1875-BL/V-TE8
Q902	8-729-905-35	2SC4081-R
Q903	8-729-402-19	XN6501

Be sure to always read "Precautions for replacement" in page 88 when replacing the CD-74 board, complete and CCD imager block (IC901 on the DT-77 board).

LD-51 BOARD (COMPONENT SIDE)



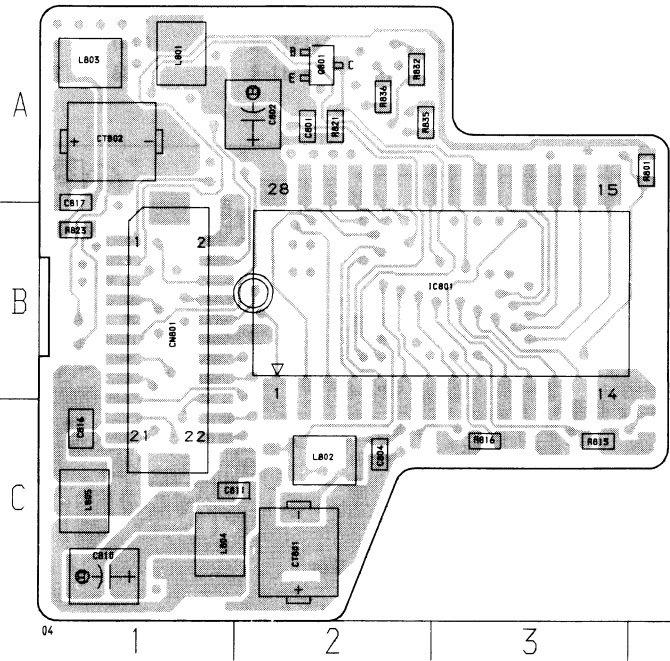
LD-51 BOARD (CONDUCTOR SIDE)



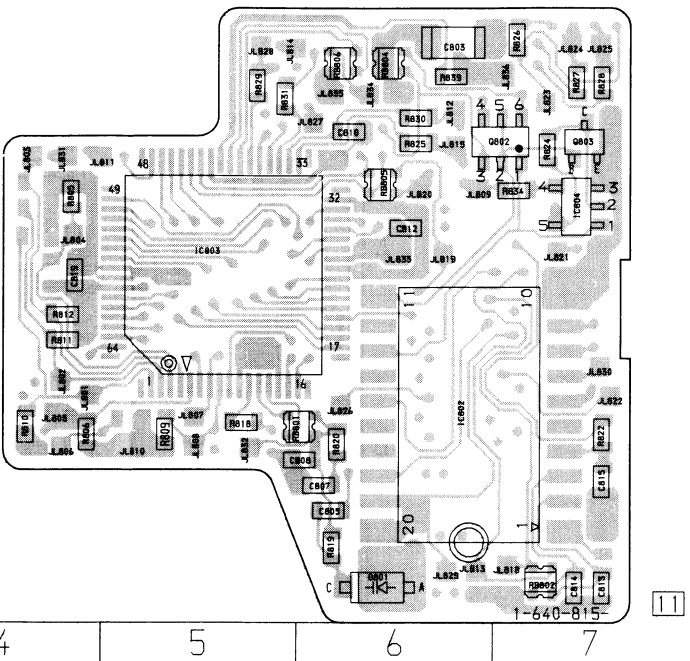
TI-40 (TITLER) PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM

—Ref. No. TI-40 BOARD : 3000 series—

TI-40 BOARD (COMPONENT SIDE)



TI-40 BOARD (CONDUCTOR SIDE)



< DIODE >

D801 8-713-300-88 1T33C

< IC >

IC801 8-759-507-53 MS6264CLL
IC802 8-759-518-62 MB-90071-104-PF
IC803 8-759-053-02 MB87818
IC804 8-759-234-20 TC7S08F

< TRANSISTOR >

Q801 8-729-905-18 DTC144EU
Q802 8-729-403-24 XN4210
Q803 8-729-905-18 DTC144EU

< DIODE >

D901 8-719-820-05 1SS181
D902 8-719-404-46 MA110
D903 8-719-404-46 MA110
D904 8-719-800-76 1SS226

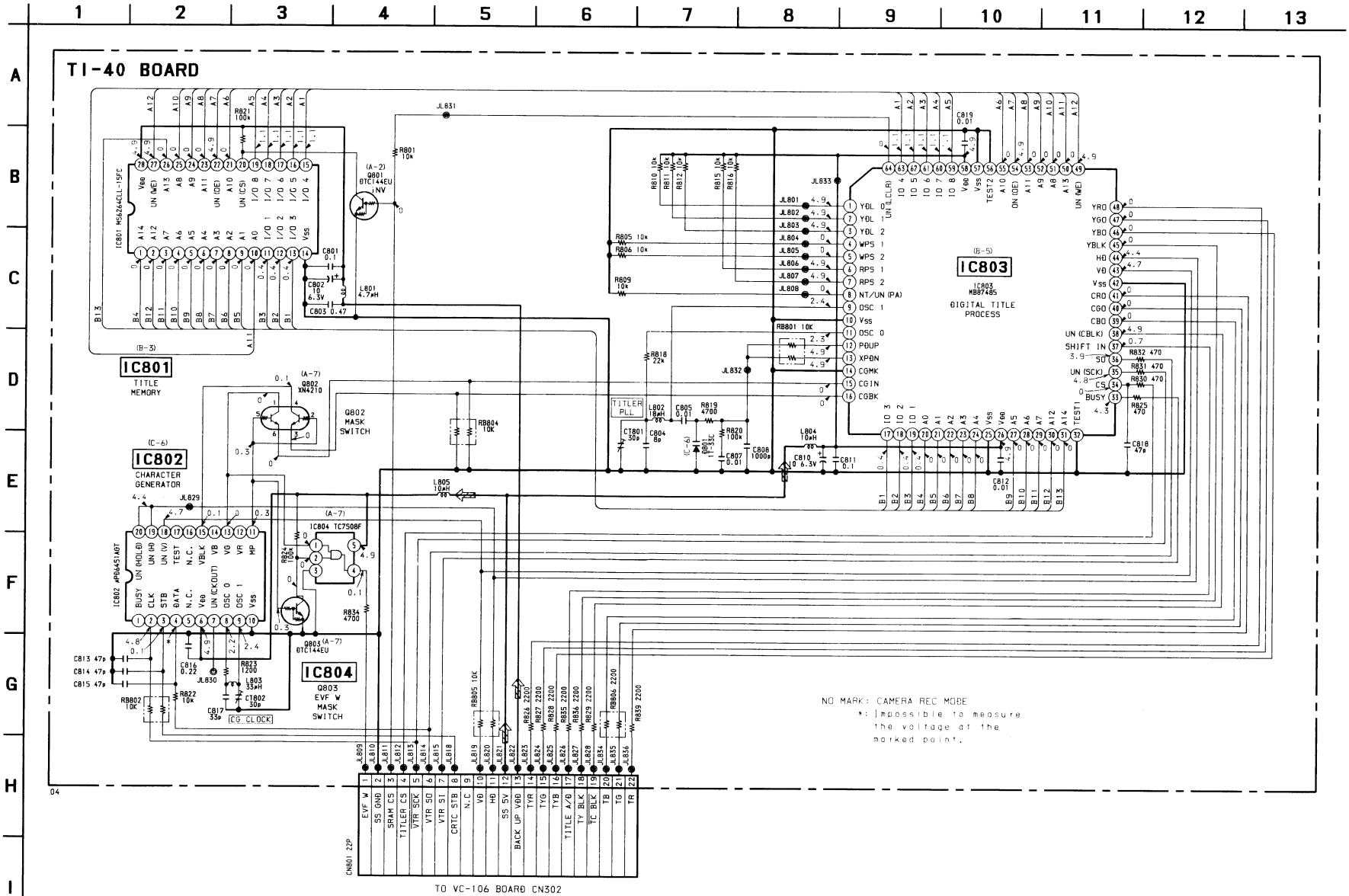
< IC >

IC901 8-752-606-77 IC ICX039BNA-2 (CCD IMAGER)

< TRANSISTOR >

Q901 8-729-232-86 2SK1875-BL/V-TE85L
Q902 8-729-905-35 2SC4081-R
Q903 8-729-402-19 XN6501

Be sure to always read "Precautions for replacement of CCD imager block" in page 88 when replacing the CD-74 board, complete, DT-77 board, complete and CCD imager block (IC901 on the CD-74 board and IC001 on the DT-77 board).



NO MARK: CAMERA REC MOBE
*: Impossible to measure
the voltage at the
marked point.

TO VC-106 BOARD CN302

< DIODE >

D152 8-719-949-46 1T32
D153 8-719-404-46 MA110
D251 8-719-404-46 MA110
D253 8-719-404-46 MA110
D254 8-719-404-46 MA110
D351 8-719-404-46 MA110
D401 8-719-421-03 MA732
D402 8-719-404-35 MA141WK
D403 8-719-820-05 1SS181
D404 8-719-820-05 1SS181
D405 8-719-404-35 MA141WK
D406 8-719-404-46 MA110
D551 8-719-404-46 MA110
D552 8-719-404-35 MA141WK
D553 8-719-404-46 MA110

< HIC >

HIC101 A-7068-194-A DT-77 BOARD, COMPLETE

< IC >

IC151 8-752-339-77 CXD2111R-T3
IC201 8-752-340-34 CXL1507AN
IC202 8-752-332-69 CXL5504M
IC203 8-752-038-97 CXA1391R
IC204 8-759-946-00 MB88341PFV
IC251 8-759-946-00 MB88341PFV
IC252 8-752-056-04 CXA1609N
IC253 8-752-039-49 CXA1393AN
IC254 8-752-057-59 CXA1592R
IC255 8-759-521-09 MB88346APFV
IC256 8-759-512-59 MB88352PFV
IC257 8-759-937-56 S-8054ALB-LM-S
IC258 8-759-008-67 MC14066BF
IC260 8-759-998-96 LM324D
IC261 8-759-044-05 MC68HC11L6FUSC400607
IC351 8-759-605-61 CXA1203N
IC401 8-752-036-19 CXA1207AR
IC501 8-752-036-20 CXA1208R
IC551 8-752-333-24 CXL1506M
IC552 8-752-333-24 CXL1506M
IC701 8-752-348-74 CXD2104AN
IC731 8-759-998-92 LM393D
IC732 8-759-509-17 XR04053BF
IC733 8-759-998-98 LM358D

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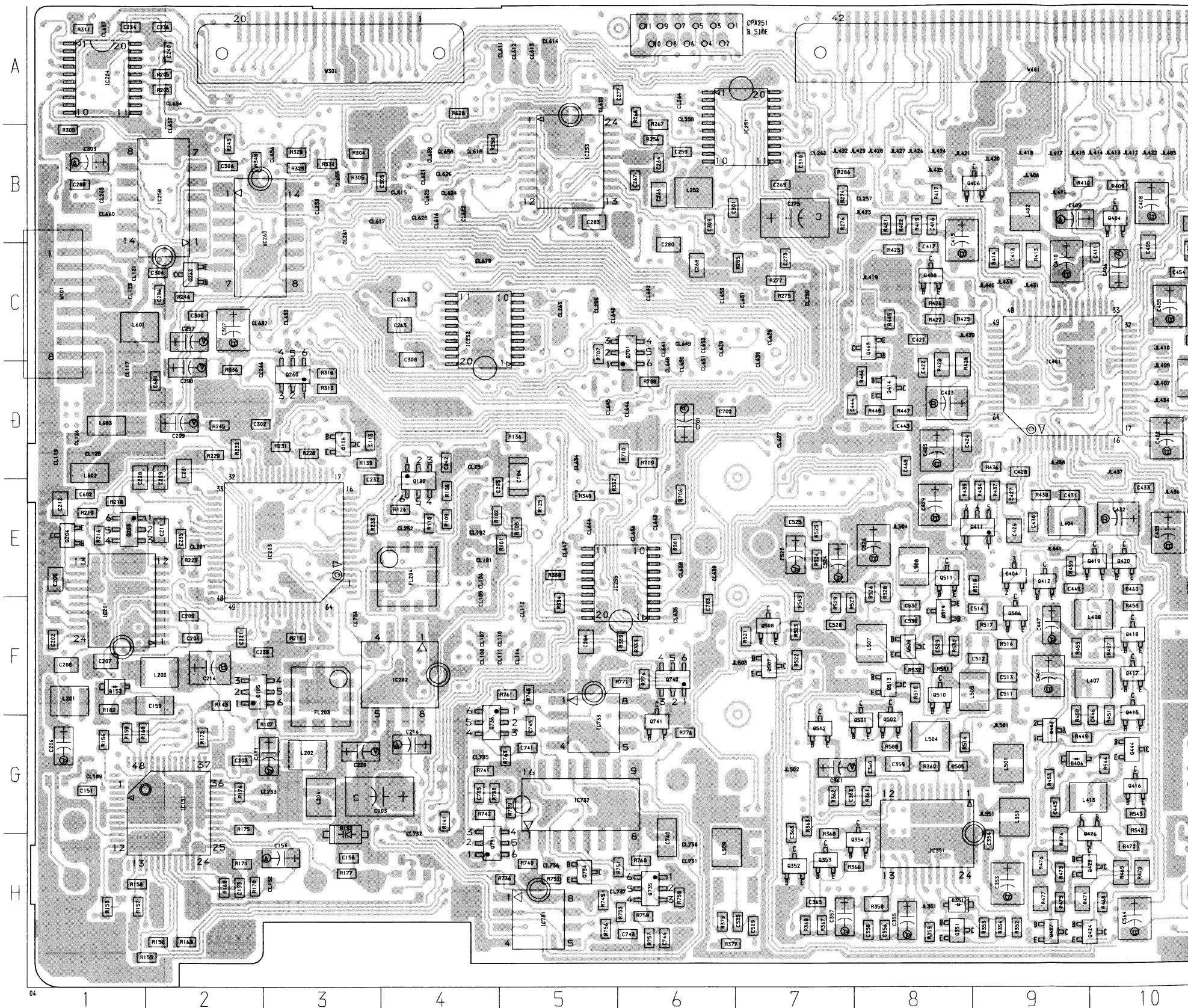
Q101 8-729-907-46 IMZ1
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Q103 8-729-907-46 IMZ1
Q104 8-729-925-42 IMT2
Q105 8-729-907-46 IMZ1
Q106 8-729-907-46 IMZ1
Q107 8-729-402-45 UN5212
Q108 8-729-905-35 2SC4081-R
Q151 8-729-905-35 2SC4081-R
Q201 8-729-905-23 2SA1576-R
Q202 8-729-905-23 2SA1576-R
Q203 8-729-925-42 IMT2
Q204 8-729-905-23 2SA1576-R
Q205 8-729-905-23 2SA1576-R
Q251 8-729-907-46 IMZ1
Q252 8-729-905-18 DTC144EU
Q253 8-729-905-23 2SA1576-R
Q254 8-729-905-35 2SC4081-R
Q255 8-729-907-46 IMZ1
Q256 8-729-905-23 2SA1576-R
Q259 8-729-925-39 IMH8
Q260 8-729-925-42 IMT2

Q261 8-729-420-50 UN5215
Q262 8-729-905-35 2SC4081-R
Q263 8-729-925-39 IMH8
Q264 8-729-420-50 UN5215
Q351 8-729-905-12 DTA144EU
Q352 8-729-905-18 DTC144EU
Q353 8-729-905-35 2SC4081-R
Q354 8-729-905-35 2SC4081-R
Q355 8-729-905-35 2SC4081-R
Q356 8-729-905-18 DTC144EU
Q401 8-729-920-48 IMH2
Q402 8-729-907-39 IMD2
Q403 8-729-905-23 2SA1576-R
Q404 8-729-905-18 DTC144EU
Q405 8-729-824-05 3SK248
Q406 8-729-905-18 DTC144EU
Q408 8-729-905-12 DTA144EU
Q409 8-729-824-02 2SA1838-TL
Q410 8-729-905-12 DTA144EU
Q411 8-729-403-06 XN1113
Q412 8-729-905-18 DTC144EU
Q413 8-729-905-18 DTC144EU
Q414 8-729-423-52 2SC3931
Q415 8-729-824-02 2SA1838
Q416 8-729-905-18 DTC144EU
Q417 8-729-905-35 2SC4081-R
Q418 8-729-905-23 2SA1576-R
Q419 8-729-905-23 2SA1576-R
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Q422 8-729-823-16 2SC4555-5.6.7
Q423 8-729-823-16 2SC4555-5.6.7
Q424 8-729-905-18 DTC144EU
Q425 8-729-905-18 DTC144EU
Q426 8-729-905-12 DTA144EU
Q427 8-729-905-18 DTC144EU
Q428 8-729-905-18 DTC144EU
Q429 8-729-905-18 DTC144EU
Q430 8-729-423-52 2SC3931
Q431 8-729-423-52 2SC3931
Q432 8-729-907-26 IMX1
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Q442 8-729-403-07 XN1213
Q443 8-729-905-18 DTC144EU
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Q446 8-729-905-18 DTC144EU
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Q501 8-729-905-35 2SC4081-R
Q502 8-729-905-35 2SC4081-R
Q505 8-729-905-23 2SA1576-R
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Q507 8-729-905-35 2SC4081-R
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Q512 8-729-905-35 2SC4081-R
Q513 8-729-905-18 DTC144EU
Q514 8-729-905-18 DTC144EU
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VC-106 (VIDEO) PRINTED WIRING BOARD

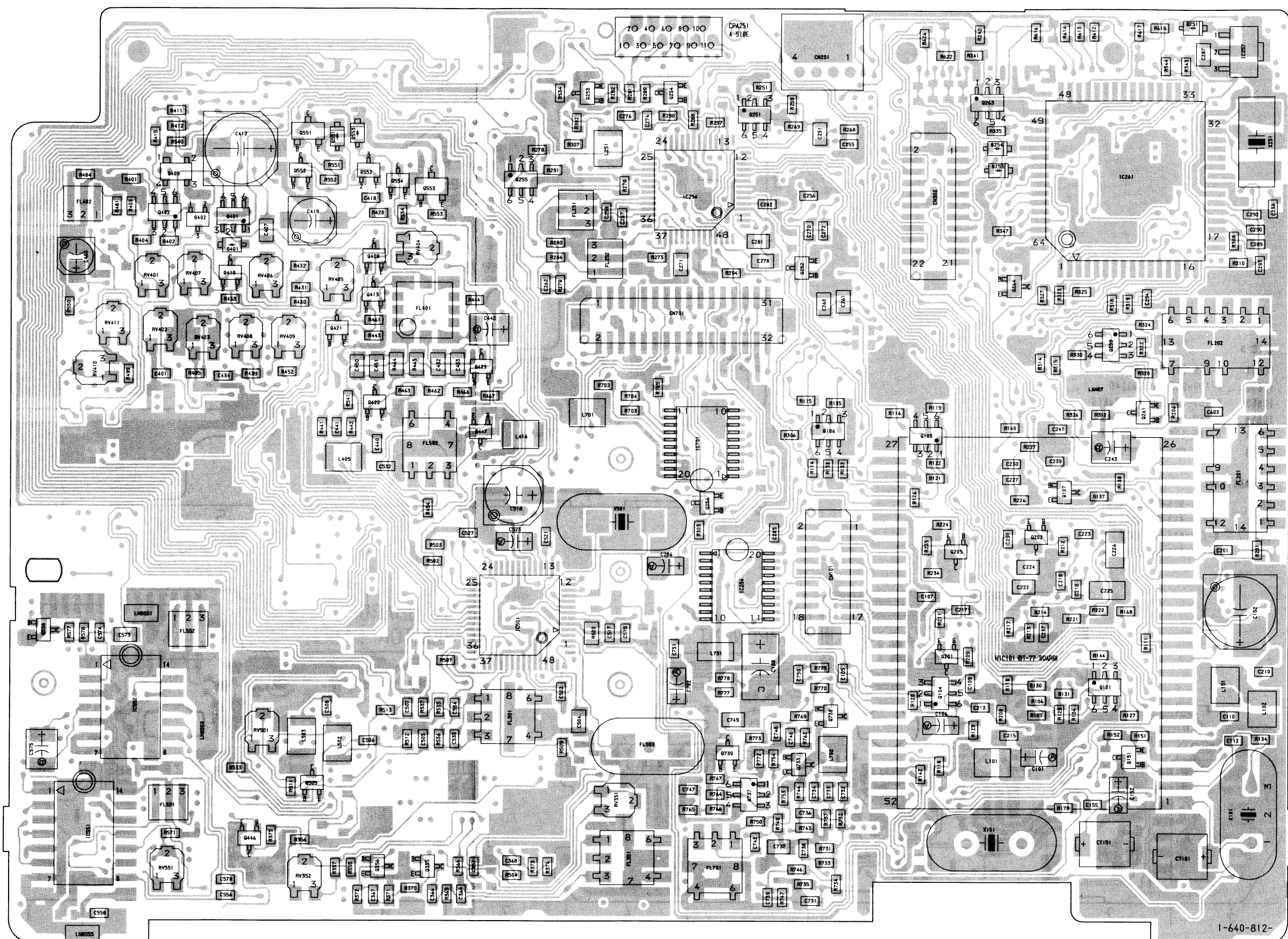
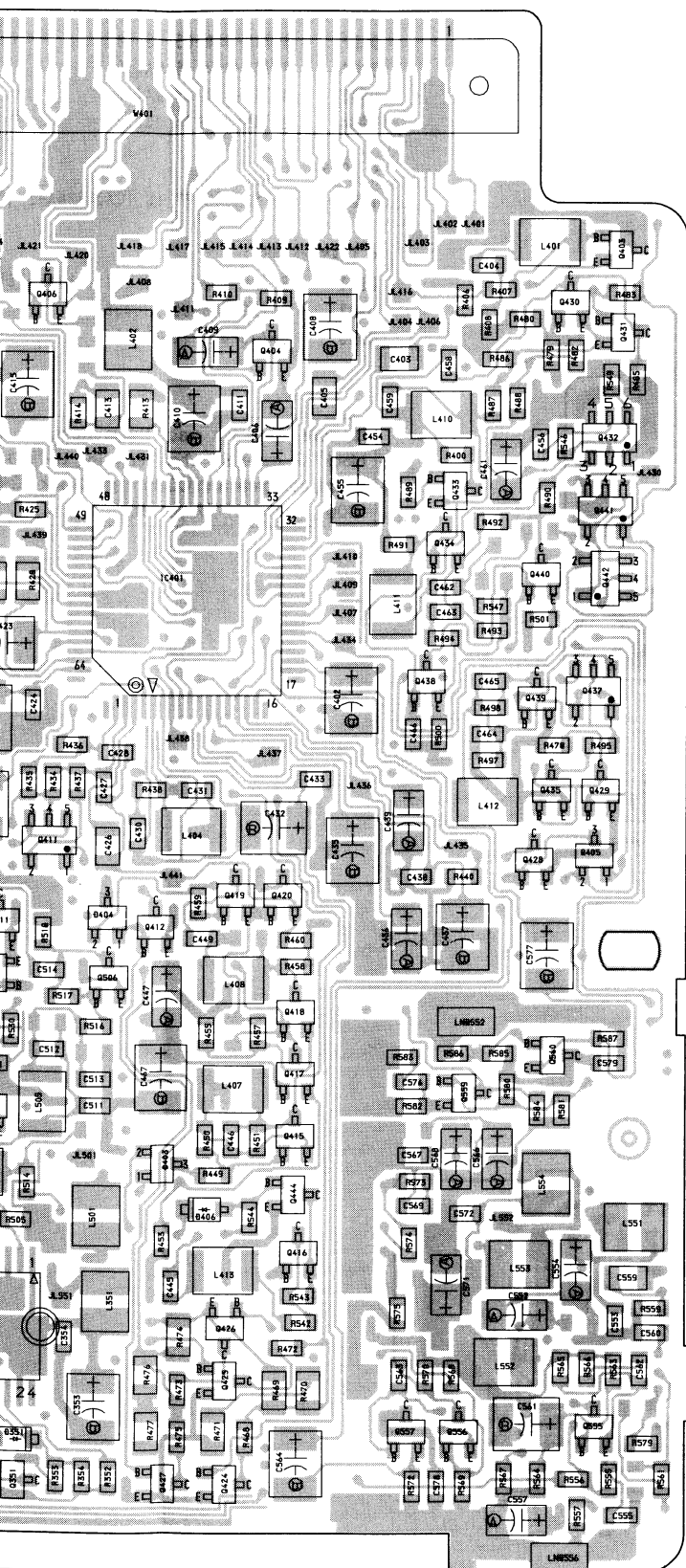
—Ref. No. VC-106 BOARD : 1000 series—

VC-106 BOARD (CONDUCTOR SIDE)



VIDEO VIDEO

VC-106 BOARD (COMPONENT SIDE)



1-640-812-

13

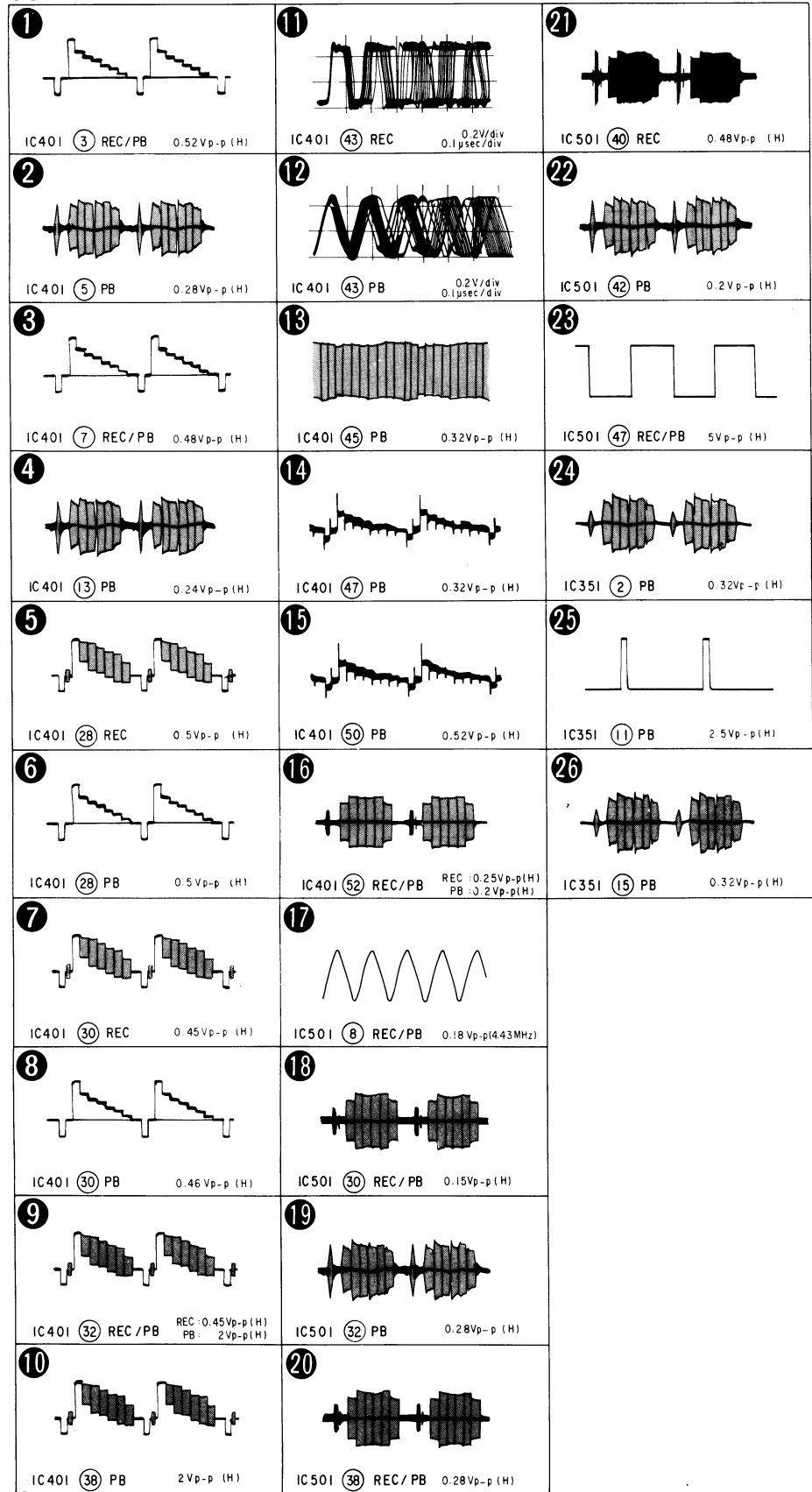
VC-106 (VIDEO) SCHEMATIC DIAGRAM

—Ref. No. VC-106 BOARD : 1000 series—

1 2 3 4 5 6

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q

VC-106 BOARD (VIDEO BLOCK)



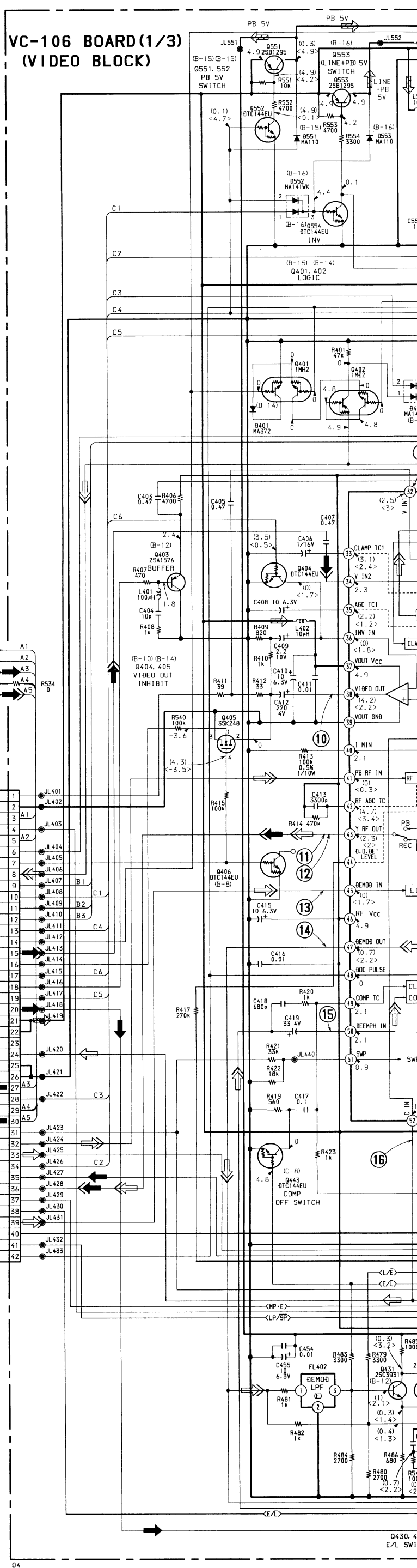
VC-106 BOARD (1/3) (VIDEO BLOCK)

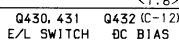
TO VC-106 BOARD (CAM2 BLOCK) (See page 108.)

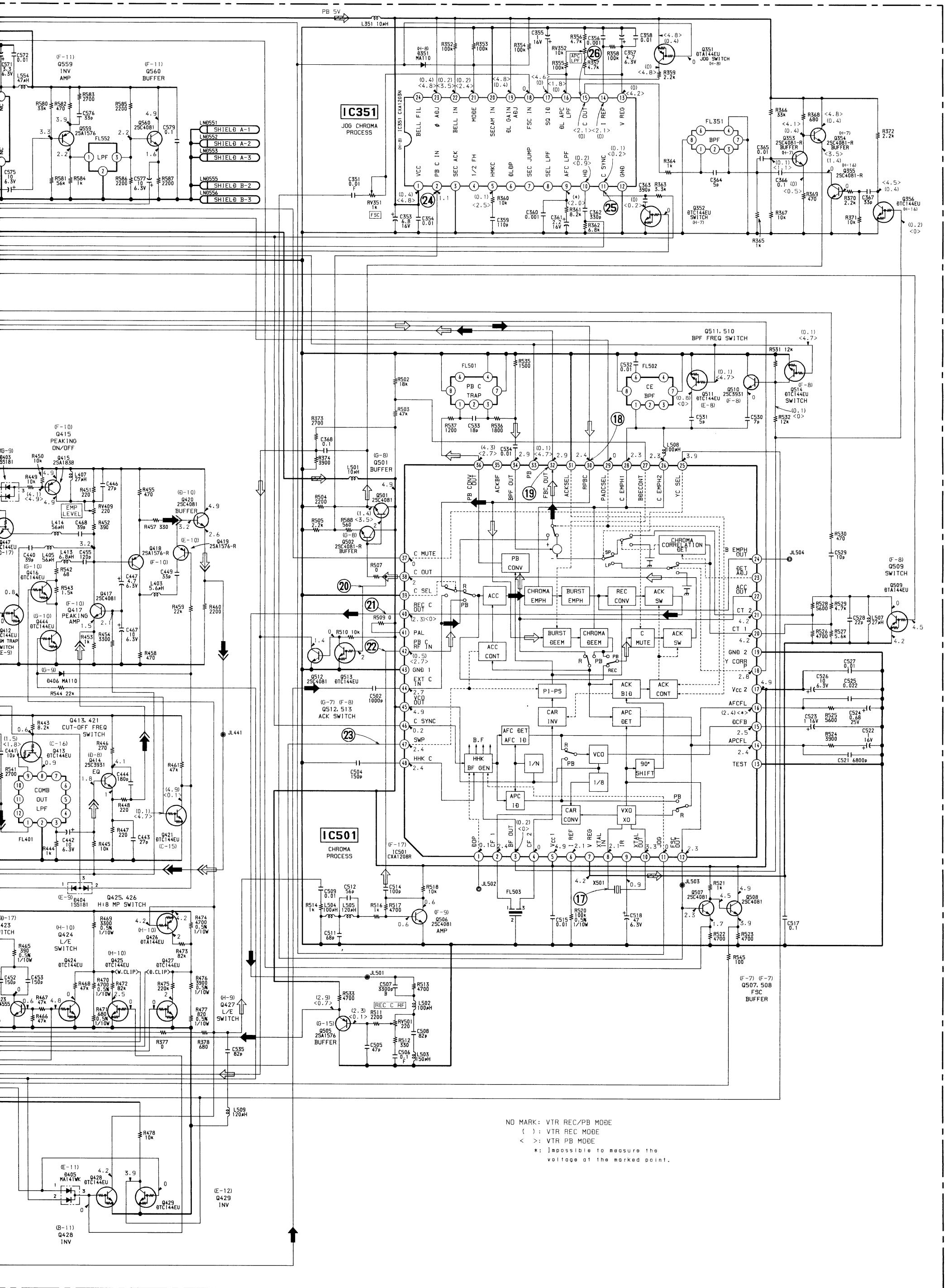
TO VS-87 BOARD CN304 (See page 139.)

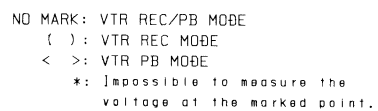
TO VS-87 BOARD CN305 (See page 139.)

VIDEO I/O	1	JL401
VIDEO I/O GND	2	JL402
AUDIO FADER	3	JL403
FSC	4	JL404
EVF VOW	5	JL405
VTR SYNC	6	JL406
VIDEO IN/OUT	7	JL407
EE PB Y	8	JL408
VIDEO CS	9	JL409
COMPOSITE REC	10	JL410
VTR SCK	11	JL411
VTR SO	12	JL412
VA PB	13	JL413
JOG	14	JL414
S REC Y	15	JL415
VEE	16	JL416
IN/OUT	17	JL417
V OUT Y	18	JL418
EDIT	19	JL419
S REC C	20	JL420
VIDEO 5V	21	JL421
VIDEO 5V	22	JL422
N.C	23	JL423
EE PB C	24	JL424
VIDEO GND	25	JL425
VIDEO GND	26	JL426
CAM C	27	JL427
JOG V0	28	JL428
CAM GND	29	JL429
CAM Y	30	JL430
RF SWP	31	JL431
PB Y RF	32	JL432
PB C RF	33	JL433
VIDEO MUTE	34	JL434
REC C RF	35	JL435
Y RF	36	JL436
MP+E	37	JL437
E/L	38	JL438
SOFT LIM OUT	39	JL439
RF GND	40	JL440
LP/SP	41	JL441
BOP	42	JL442





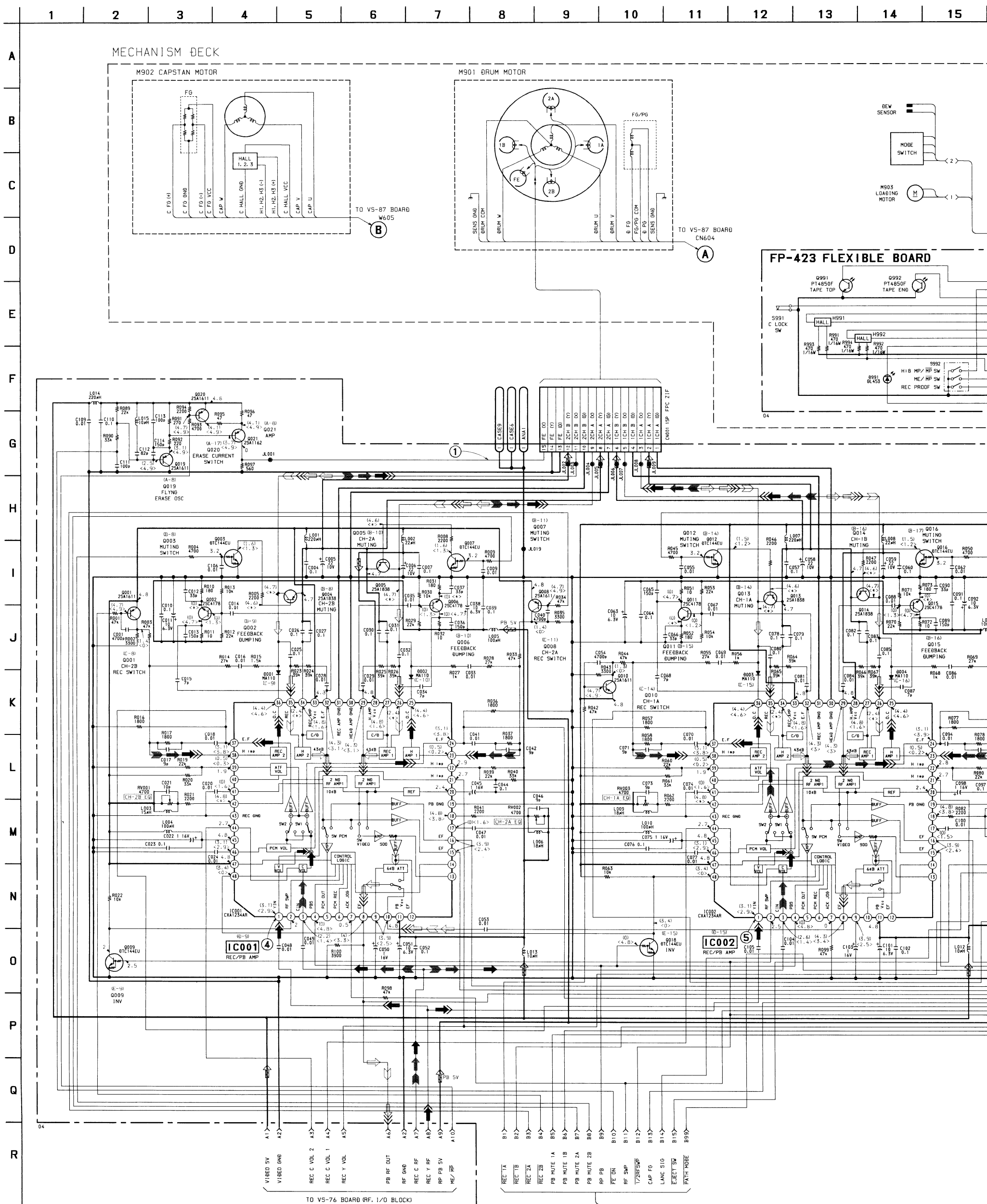




	VIDEO Signal		
	CHROMA	Y	Y/CHROMA
REC	➡	➡➡	➡➡➡
PB	➡	➡➡	➡➡➡

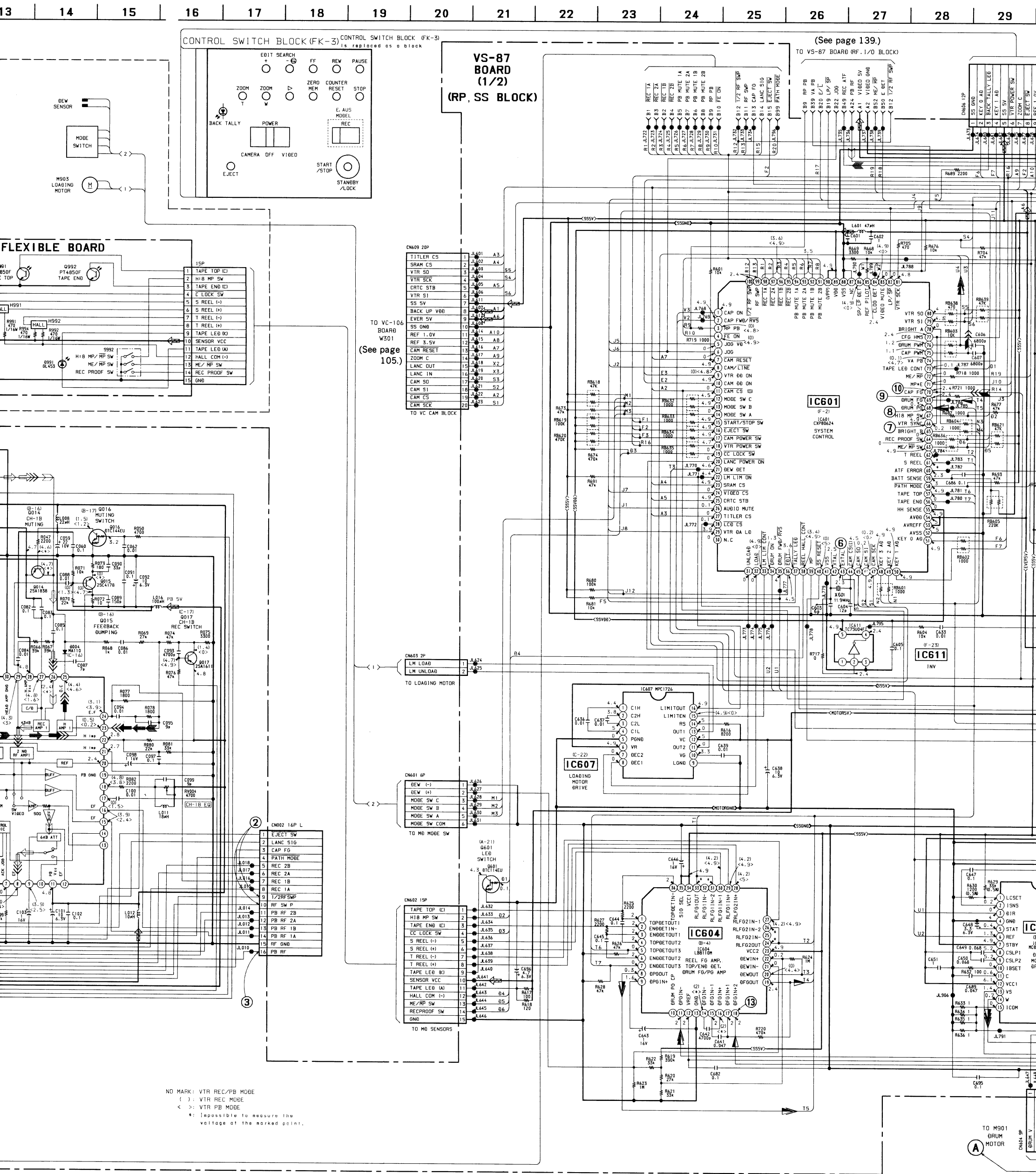
FP-423 (TAPE TOP/END SENSOR, TAPE SELECT) VS-87 (HEAD AMP, SERVO, SYSTEM CONTROL) SCHEMATIC DIAGRAM

—Ref. No. VS-87 BOARD : 5000 series, FP-423 BOARD : 8000 series—



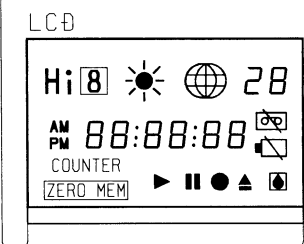
(See page 137.)

Note:



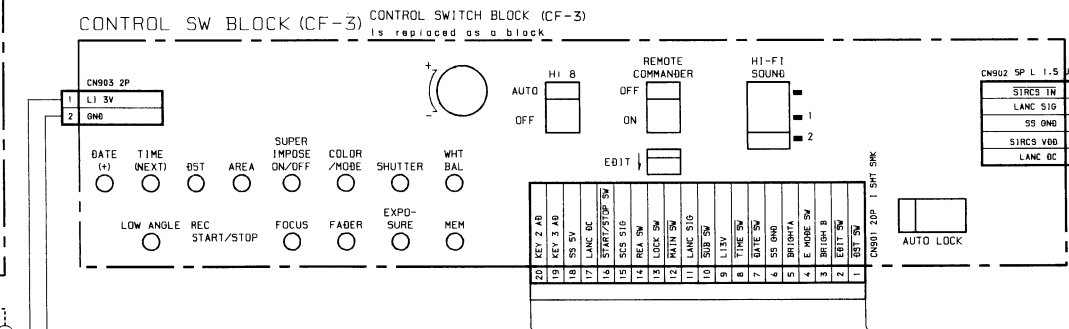
	VIDEO Signal			AUDIO Signal
	CHROMA	Y	Y/CHROMA	
REC	➡	➡➡	➡➡➡	➡
PB	➡	➡➡	➡➡➡	➡

	REC	REC/PB	PB
Drum speed servo			
Drum phase servo			
Drum servo(speed and phase)			
Capstan speed servo			
Capstan phase servo			
Capstan servo(speed and phase)			
Ref.signal			



TO VS-87
BOARD
(RF. I/O BLOCK)

(See page 139.)



(See page 149.)

FP-423 (TAPE TOP/END SENSOR, TAPE SELECT) VS-87 (HEAD AMP, SERVO, SYSTEM CONTROL) PRINTED WIRING BOARDS
—Ref. No. VS-87 BOARD : 5000 series, FP-423 BOARD : 8000 series—

< DIODE >

D001	8-719-404-46	MA110
D002	8-719-404-46	MA110
D003	8-719-404-46	MA110
D004	8-719-404-46	MA110
D151	8-719-404-46	MA110
D152	8-719-800-76	1SS226
D153	8-719-800-76	1SS226
D154	8-719-404-46	MA110
D155	8-719-404-46	MA110
D156	8-719-800-76	1SS226

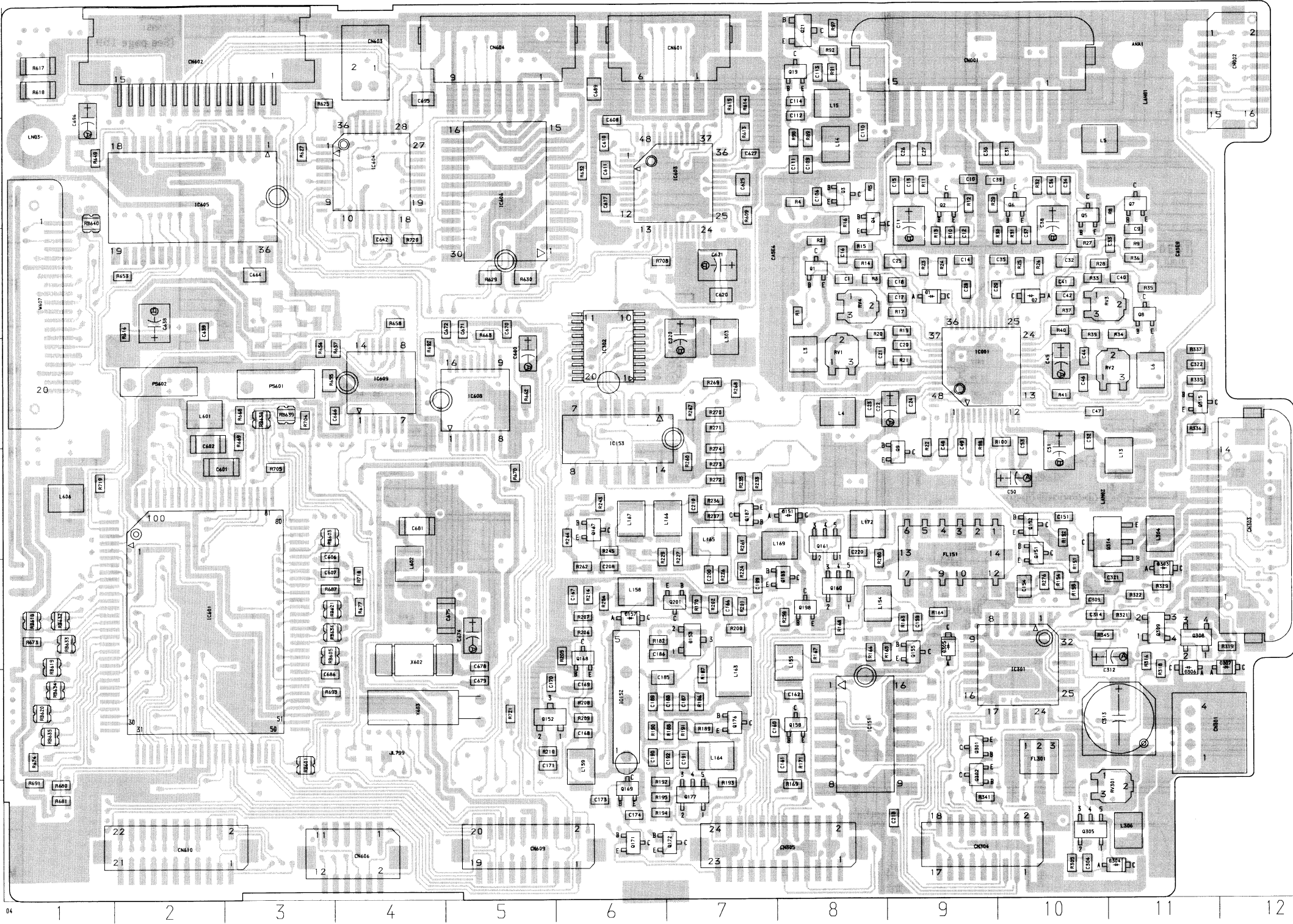
D157	8-719-404-46	MA110
D301	8-719-404-35	MA141WK
D302	8-719-404-46	MA110
D303	8-719-420-14	MA8082-M
D304	8-719-404-46	MA110
D305	8-719-404-46	MA110
D306	8-719-420-14	MA8082-M
D307	8-719-420-14	MA8082-M
D308	8-719-420-14	MA8082-M
D309	8-719-420-14	MA8082-M
D601	8-719-421-27	MA728

< IC >

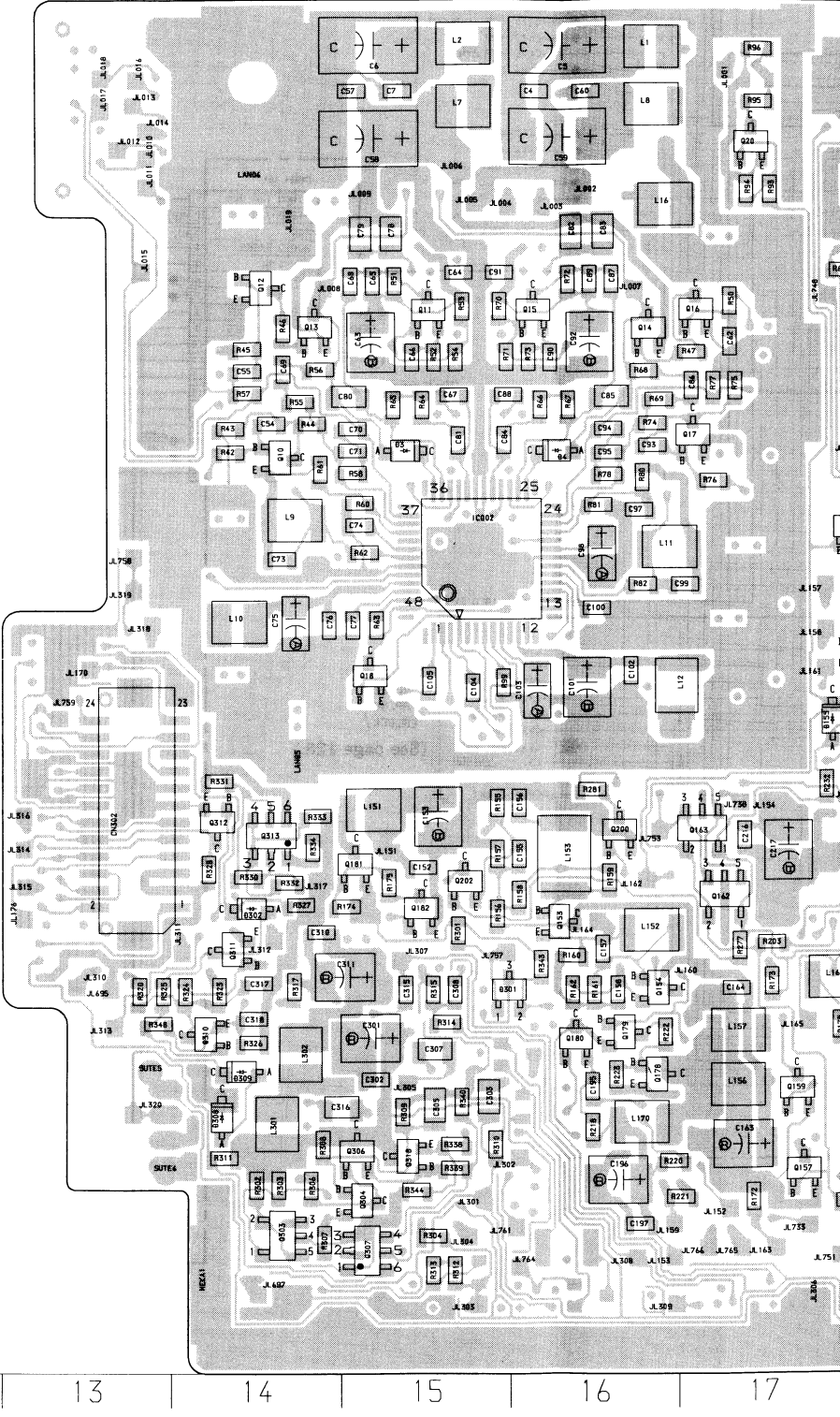
IC001	8-752-033-00	CXA1234AR
IC002	8-752-033-00	CXA1234AR
IC151	8-759-998-32	CXD-2107M
IC152	8-759-925-60	BA401
IC153	8-759-509-05	XRU4066BF
IC301	8-759-038-83	MC13400FUEB
IC302	8-759-521-09	MB88346APFV
IC601	8-752-833-59	CXP80624-245Q
IC602	8-759-044-07	uPD75304GF-210-3B9
IC603	8-759-512-42	CXA1481R

IC604	8-759-823-90	L88110M
IC605	8-759-823-65	MCD002AM
IC606	8-759-057-60	MCD004BM
IC607	8-759-038-98	MPC1726MR2
IC608	8-759-511-22	CXA1448N
IC609	8-759-999-02	TL1596CDB
IC610	8-759-512-69	S-81350HG
IC611	8-759-243-19	TC7SU04F

VS-87 BOARD (COMPONENT SIDE)



VS-87 BOARD (CONDUCTOR SIDE)



< IC >

-719-404-46	MA110	IC001	8-752-033-00	CXA1234AR
-719-404-35	MA141WK	IC002	8-752-033-00	CXA1234AR
-719-404-46	MA110	IC151	8-759-998-32	CXD-2107M
-719-420-14	MA8082-M	IC152	8-759-925-60	BA401
-719-404-46	MA110	IC153	8-759-509-05	XRU4066BF
-719-404-46	MA110	IC301	8-759-038-83	MC13400FUEB
-719-420-14	MA8082-M	IC302	8-759-521-09	MB88346APFV
-719-420-14	MA8082-M	IC601	8-752-833-59	CXP80624-245Q
-719-420-14	MA8082-M	IC602	8-759-044-07	uPD75304GF-210-3B9
-719-420-14	MA8082-M	IC603	8-759-512-42	CXA1481R
-719-421-27	MA728			

< TRANSISTOR >

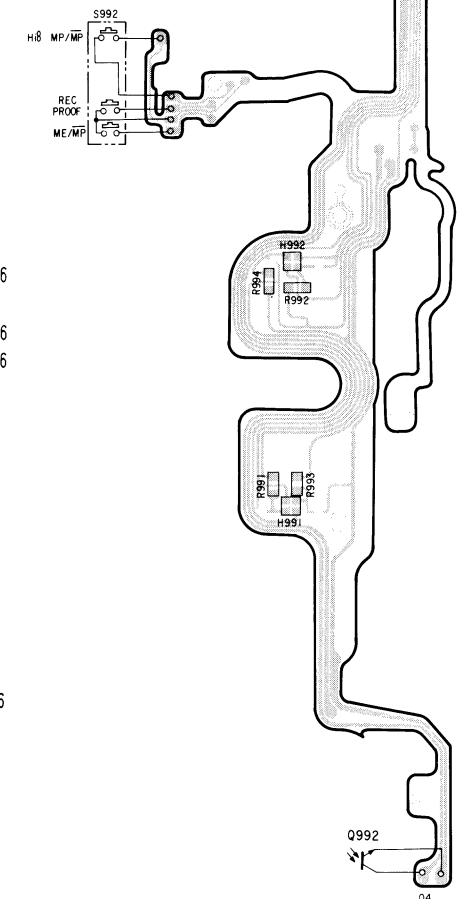
Q001	8-729-140-63	2SA1611-M5M6
Q002	8-729-423-52	2SC3931
Q003	8-729-905-18	DTC144EU
Q004	8-729-824-02	2SA1838
Q005	8-729-824-02	2SA1838
Q006	8-729-423-52	2SC3931
Q007	8-729-905-18	DTC144EU
Q008	8-729-140-63	2SA1611-M5M6
Q009	8-729-905-18	DTC144EU
Q010	8-729-140-63	2SA1611-M5M6
Q011	8-729-423-52	2SC3931
Q012	8-729-905-18	DTC144EU
Q013	8-729-824-02	2SA1838
Q014	8-729-824-02	2SA1838
Q015	8-729-423-52	2SC3931
Q016	8-729-905-18	DTC144EU
Q017	8-729-140-63	2SA1611-M5M6
Q018	8-729-905-18	DTC144EU
Q019	8-729-140-63	2SA1611-M5M6
Q020	8-729-140-63	2SA1611-M5M6
Q021	8-729-216-22	2SA1162
Q151	8-729-423-52	2SC3931
Q152	8-729-905-35	2SC4081-R
Q153	8-729-905-35	2SC4081-R
Q154	8-729-423-52	2SC3931
Q155	8-729-140-63	2SA1611-M5M6
Q157	8-729-905-18	DTC144EU
Q158	8-729-905-35	2SC4081-R
Q159	8-729-905-18	DTC144EU
Q160	8-729-904-20	FMA2

Q161	8-729-904-07	FMG2
Q162	8-729-904-20	FMA2
Q163	8-729-904-07	FMG2
Q165	8-729-823-16	2SC4555-5.6.7
Q166	8-729-905-18	DTC144EU
Q167	8-729-905-35	2SC4081-R
Q168	8-729-423-52	2SC3931
Q169	8-729-905-12	DTA144EU
Q170	8-729-905-35	2SC4081-R
Q171	8-729-905-18	DTC144EU
Q172	8-729-905-18	DTC144EU
Q173	8-729-905-18	DTC144EU
Q174	8-729-905-35	2SC4081-R
Q175	8-729-905-35	2SC4081-R
Q176	8-729-602-21	2SC4154
Q176	8-729-905-35	2SC4081-R
Q177	8-729-903-10	FMW1
Q178	8-729-140-63	2SA1611-M5M6
Q179	8-729-905-18	DTC144EU
Q180	8-729-140-63	2SA1611-M5M6
Q181	8-729-140-63	2SA1611-M5M6
Q182	8-729-905-18	DTC144EU
Q183	8-729-905-35	2SC4081-R
Q186	8-729-905-35	2SC4081-R
Q187	8-729-905-18	DTC144EU
Q189	8-729-903-10	FMW1
Q192	8-729-905-18	DTC144EU
Q193	8-729-904-20	FMA2
Q194	8-729-905-12	DTA144EU
Q195	8-729-905-35	2SC4081-R
Q196	8-729-905-18	DTC144EU
Q197	8-729-905-35	2SC4081-R
Q198	8-729-140-63	2SA1611-M5M6
Q199	8-729-905-18	DTC144EU
Q200	8-729-905-18	DTC144EU
Q201	8-729-905-35	2SC4081-R
Q202	8-729-905-35	2SC4081-R
Q301	8-729-905-96	DTA114TU
Q302	8-729-905-18	DTC144EU
Q303	8-729-904-07	FMG2
Q304	8-729-423-52	2SC3931
Q305	8-729-421-23	XN1216
Q306	8-729-423-52	2SC3931
Q307	8-729-402-78	XN6401
Q308	8-729-824-05	3SK248
Q309	8-729-824-05	3SK248
Q310	8-729-905-35	2SC4081-R
Q311	8-729-921-58	DTA144TU
Q312	8-729-905-18	DTC144EU
Q313	8-729-402-78	XN6401
Q314	8-729-106-60	2SB1115A
Q315	8-729-905-23	2SA1576-R
Q318	8-729-905-35	2SC4081-R
Q601	8-729-907-00	DTC114EU

VS-87 BOARD (CONDUCTOR SIDE)



FP-423 FLEXI (COMPO



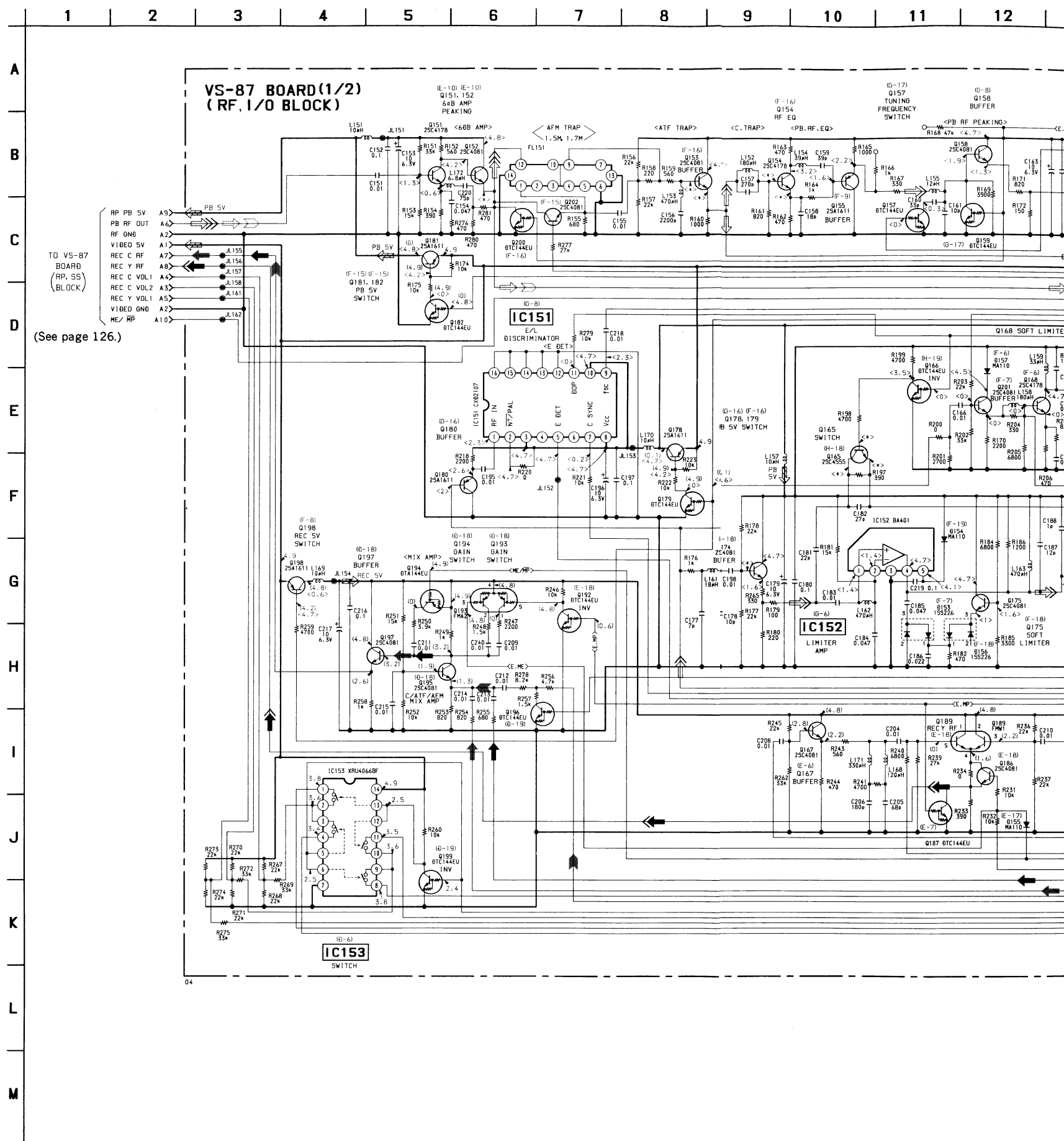
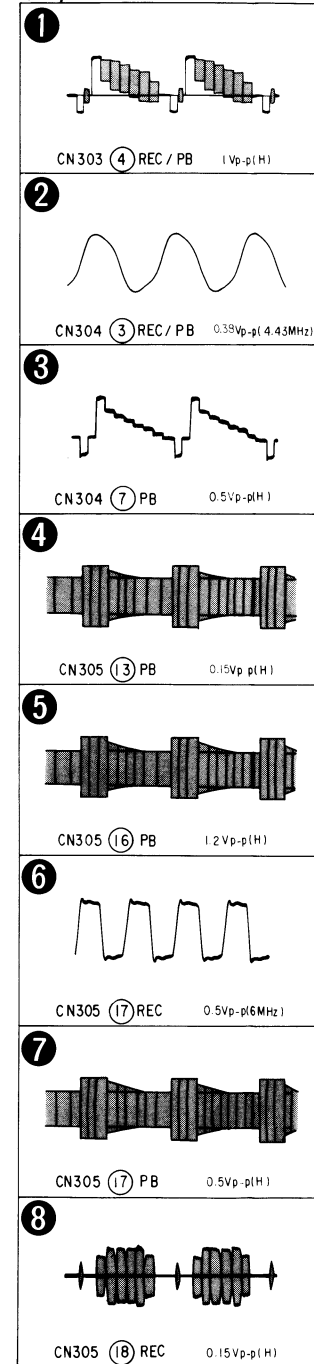
• Signal path

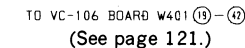
	VIDEO Signal			AUDIO Signal
	CHROMA	Y	Y/CHROMA	
REC	➡	➡	➡	➡
PB	➡	➡	➡	➡

• Signal path

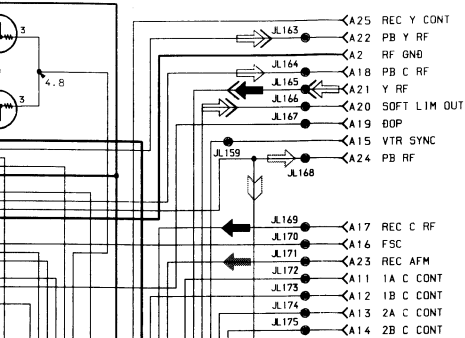
	REC	REC/PB	PB
Drum speed servo		▶	
Drum phase servo		▶	
Drum servo(speed and phase)		▶	
Capstan speed servo		▶	
Capstan phase servo	▶	▶	▶
Capstan servo(speed and phase)	▶	▶	▶
Ref.signal	▶	▶	▶

VS-87 BOARD
(RF, I/O BLOCK)

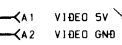




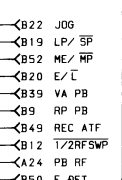
17(E-17)
2.163



TO VC-106 BOARD W401 (1-18)
(See page 121.)

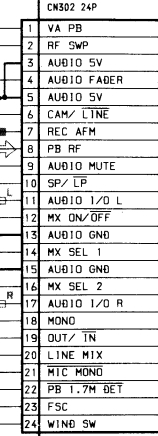
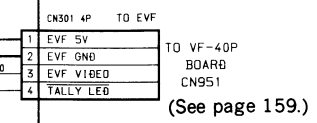
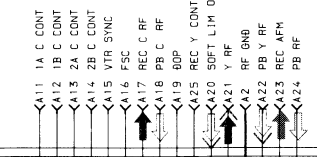
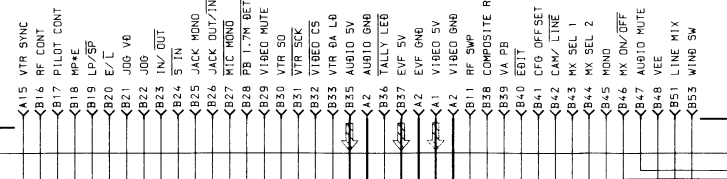


TO VS-87 BOARD (RP, SS) BLOCK
(See page 128.)

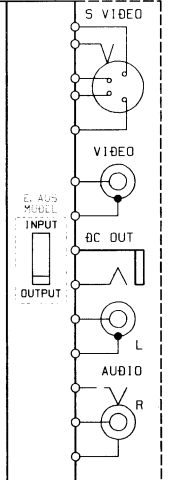
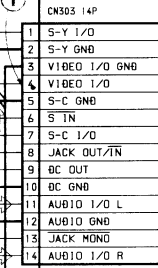


(See page 130.)

TO VS-87 BOARD (RP, SS BLOCK)

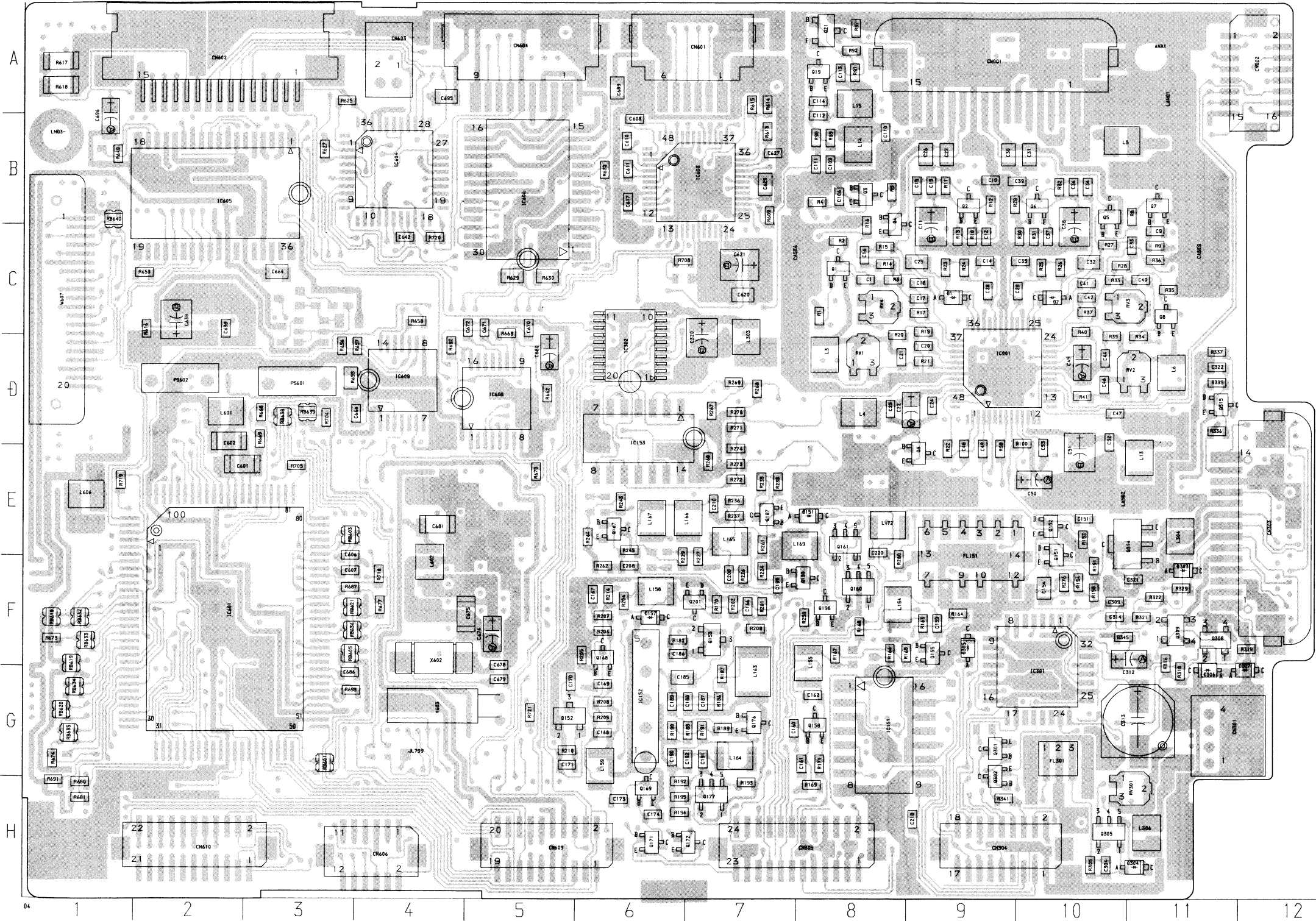


JACK BOARD ASSY
JACK BOARD ASSY is replaced as a block.



VS-87 (RF, IN/OUT) PRINTED WIRING BOARD
—Ref. No. VS-87 BOARD : 5000 series—

VS-87 BOARD (COMPONENT SIDE)



VS-87 BOARD (CONDUCTOR SIDE)





< DIODE >

D001	8-719-404-46	MA110
D002	8-719-404-46	MA110
D003	8-719-404-46	MA110
D004	8-719-404-46	MA110
D151	8-719-404-46	MA110
D152	8-719-800-76	1SS226
D153	8-719-800-76	1SS226
D154	8-719-404-46	MA110
D155	8-719-404-46	MA110
D156	8-719-800-76	1SS226
D157	8-719-404-46	MA110
D301	8-719-404-35	MA141WK
D302	8-719-404-46	MA110
D303	8-719-420-14	MA8082-M
D304	8-719-404-46	MA110
D305	8-719-404-46	MA110
D306	8-719-420-14	MA8082-M
D307	8-719-420-14	MA8082-M
D308	8-719-420-14	MA8082-M
D309	8-719-420-14	MA8082-M
D601	8-719-421-27	MA728

< IC >

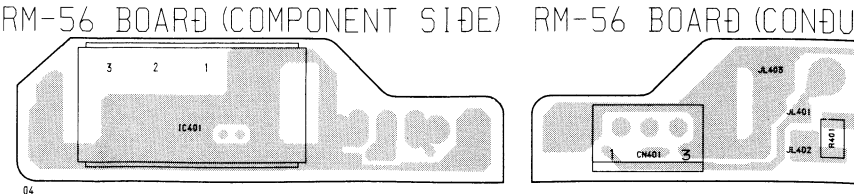
IC001	8-752-033-00	CXA1234AR
IC002	8-752-033-00	CXA1234AR
IC151	8-759-998-32	CXD-2107M
IC152	8-759-925-60	BA401
IC153	8-759-509-05	XRU4066BF
IC301	8-759-038-83	MC13400FUEB
IC302	8-759-521-09	MB88346APFV
IC601	8-752-833-59	CXP80624-245Q
IC602	8-759-044-07	uPD75304GF-210-3B9
IC603	8-759-512-42	CXA1481R
IC604	8-759-823-90	LB8110M
IC605	8-759-823-65	MCD002AM
IC606	8-759-057-60	MCD004BM
IC607	8-759-038-98	MPC1726MR2
IC608	8-759-511-22	CXA1448N
IC609	8-759-999-02	TL1596CDB
IC610	8-759-512-69	S-81350HG-KD
IC611	8-759-243-19	TC7SU04F

< TRANSISTOR >

Q001	8-729-140-63	2SA1611-M5M6
Q002	8-729-423-52	2SC3931
Q003	8-729-905-18	DTC144EU
Q004	8-729-824-02	2SA1838
Q005	8-729-824-02	2SA1838
Q006	8-729-423-52	2SC3931
Q007	8-729-905-18	DTC144EU
Q008	8-729-140-63	2SA1611-M5M6
Q009	8-729-905-18	DTC144EU
Q010	8-729-140-63	2SA1611-M5M6
Q011	8-729-423-52	2SC3931
Q012	8-729-905-18	DTC144EU
Q013	8-729-824-02	2SA1838
Q014	8-729-824-02	2SA1838
Q015	8-729-423-52	2SC3931
Q016	8-729-905-18	DTC144EU
Q017	8-729-140-63	2SA1611-M5M6
Q018	8-729-905-18	DTC144EU
Q019	8-729-140-63	2SA1611-M5M6
Q020	8-729-140-63	2SA1611-M5M6

Q021	8-729-216-22	2SA1162
Q151	8-729-423-52	2SC3931
Q152	8-729-905-35	2SC4081-R
Q153	8-729-905-35	2SC4081-R
Q154	8-729-423-52	2SC3931
Q155	8-729-140-63	2SA1611-M5M6
Q157	8-729-905-18	DTC144EU
Q158	8-729-905-35	2SC4081-R
Q159	8-729-905-18	DTC144EU
Q160	8-729-904-20	FMA2
Q161	8-729-904-07	FMG2
Q162	8-729-904-20	FMA2
Q163	8-729-904-07	FMG2
Q165	8-729-823-16	2SC4555-5.6.7
Q166	8-729-905-18	DTC144EU
Q167	8-729-905-35	2SC4081-R
Q168	8-729-423-52	2SC3931
Q169	8-729-905-12	DTA144EU
Q170	8-729-905-35	2SC4081-R
Q171	8-729-905-18	DTC144EU
Q172	8-729-905-18	DTC144EU
Q173	8-729-905-18	DTC144EU
Q174	8-729-905-35	2SC4081-R
Q175	8-729-905-35	2SC4081-R
Q176	8-729-602-21	2SC4154
Q176	8-729-905-35	2SC4081-R
Q177	8-729-903-10	FMW1
Q178	8-729-140-63	2SA1611-M5M6
Q179	8-729-905-18	DTC144EU
Q180	8-729-140-63	2SA1611-M5M6
Q181	8-729-140-63	2SA1611-M5M6
Q182	8-729-905-18	DTC144EU
Q183	8-729-905-35	2SC4081-R
Q186	8-729-905-35	2SC4081-R
Q187	8-729-905-18	DTC144EU
Q189	8-729-903-10	FMW1
Q192	8-729-905-18	DTC144EU
Q193	8-729-904-20	FMA2
Q194	8-729-905-12	DTA144EU
Q195	8-729-905-35	2SC4081-R
Q196	8-729-905-18	DTC144EU
Q197	8-729-905-35	2SC4081-R
Q198	8-729-140-63	2SA1611-M5M6
Q199	8-729-905-18	DTC144EU
Q200	8-729-905-18	DTC144EU
Q201	8-729-905-35	2SC4081-R
Q202	8-729-905-35	2SC4081-R
Q301	8-729-905-96	DTA114TU
Q302	8-729-905-18	DTC144EU
Q303	8-729-904-07	FMG2
Q304	8-729-423-52	2SC3931
Q305	8-729-421-23	XN1216
Q306	8-729-423-52	2SC3931
Q307	8-729-402-78	XN6401
Q308	8-729-824-05	3SK248
Q309	8-729-824-05	3SK248
Q310	8-729-905-35	2SC4081-R
Q311	8-729-921-58	DTA144TU
Q312	8-729-905-18	DTC144EU
Q313	8-729-402-78	XN6401
Q314	8-729-106-60	2SB1115A
Q315	8-729-905-23	2SA1576-R
Q318	8-729-905-35	2SC4081-R
Q601	8-729-907-00	DTC114EU

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IC401 8-741-100-64 SBX1621-51



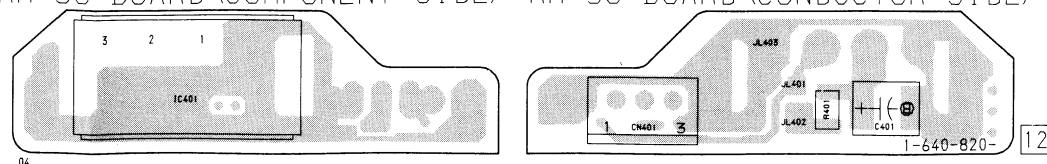
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IC801 8-759-823-19 CXA1488R
IC802 8-759-823-19 CXA1488R
IC803 8-759-823-21 CXA1536Q
IC804 8-759-008-67 MC14066BF

< TRANSISTOR >
Q801 8-729-905-23 2SA1576-R
Q802 8-729-905-18 DTC144EU
Q803 8-729-402-81 XN4501
Q804 8-729-402-81 XN4501
Q805 8-729-402-81 XN4501

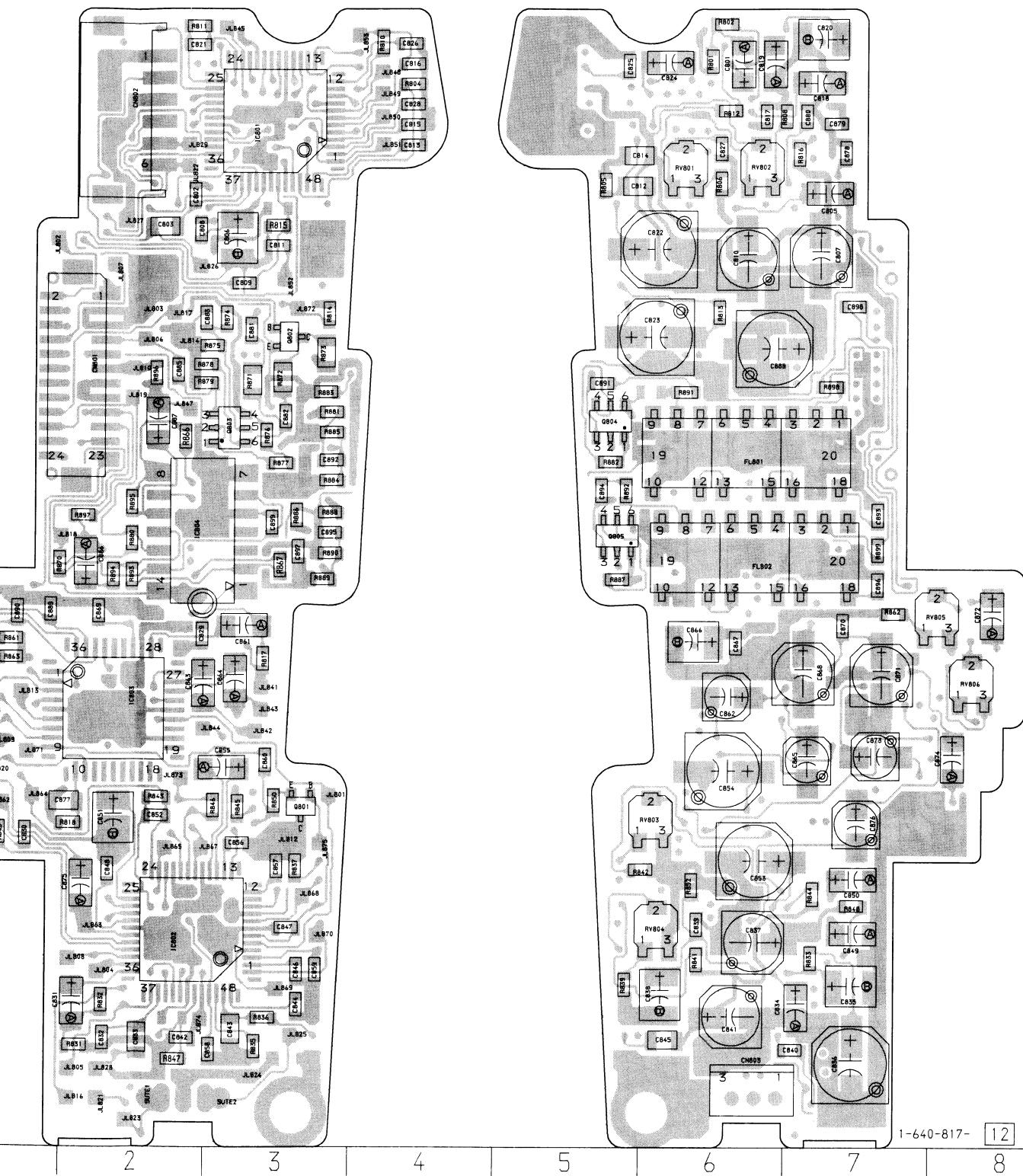


RM-56 BOARD (COMPONENT SIDE) RM-56 BOARD (CONDUCTOR SIDE)

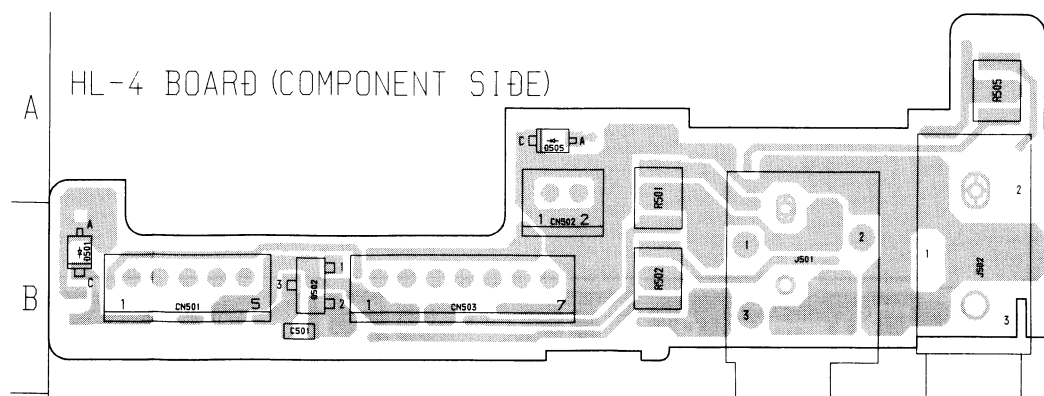
1-51



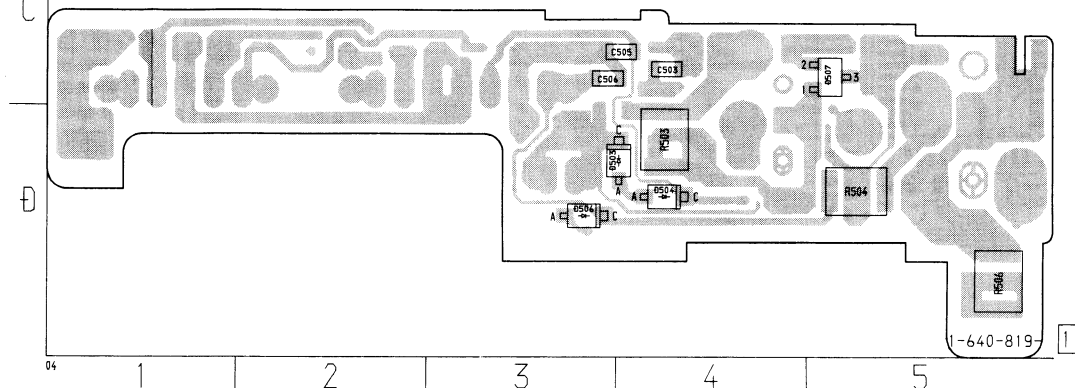
AU-121 BOARD (CONDUCTOR SIDE) AU-121 BOARD (COMPONENT SIDE)



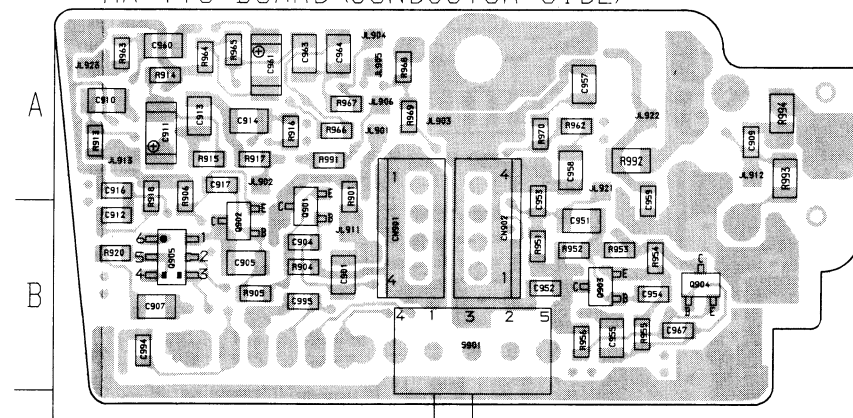
HL-4 BOARD (COMPONENT SIDE)



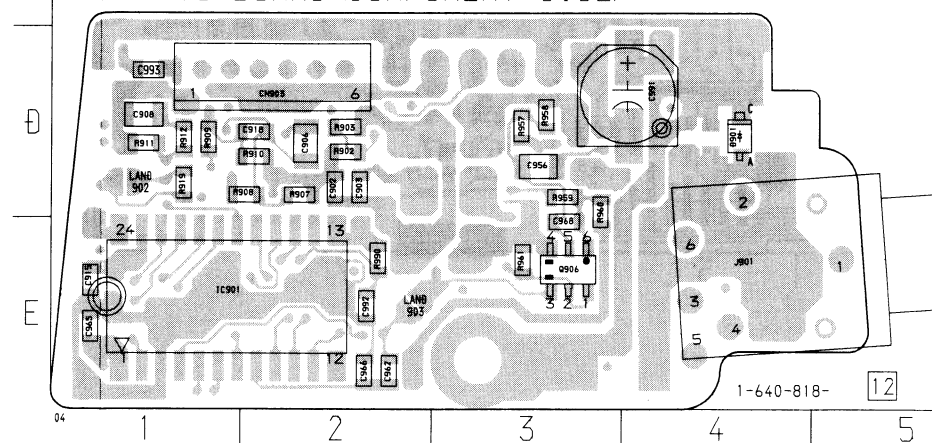
HL-4 BOARD (CONDUCTOR SIDE)



MA-116 BOARD (CONDUCTOR SIDE)



MA-116 BOARD (COMPONENT SIDE)



< DIODE >

D501	8-719-420-14	MA8082-M
D502	8-719-106-71	RD12M-B2
D503	8-719-420-14	MA8082-M
D504	8-719-420-14	MA8082-M
D505	8-719-420-14	MA8082-M
D506	8-719-420-14	MA8082-M
D507	8-719-941-86	DAN202U

< DIODE >

D901	8-719-404-46	MA110
------	--------------	-------

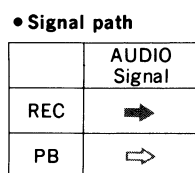
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IC901	8-759-823-41	LA7470M
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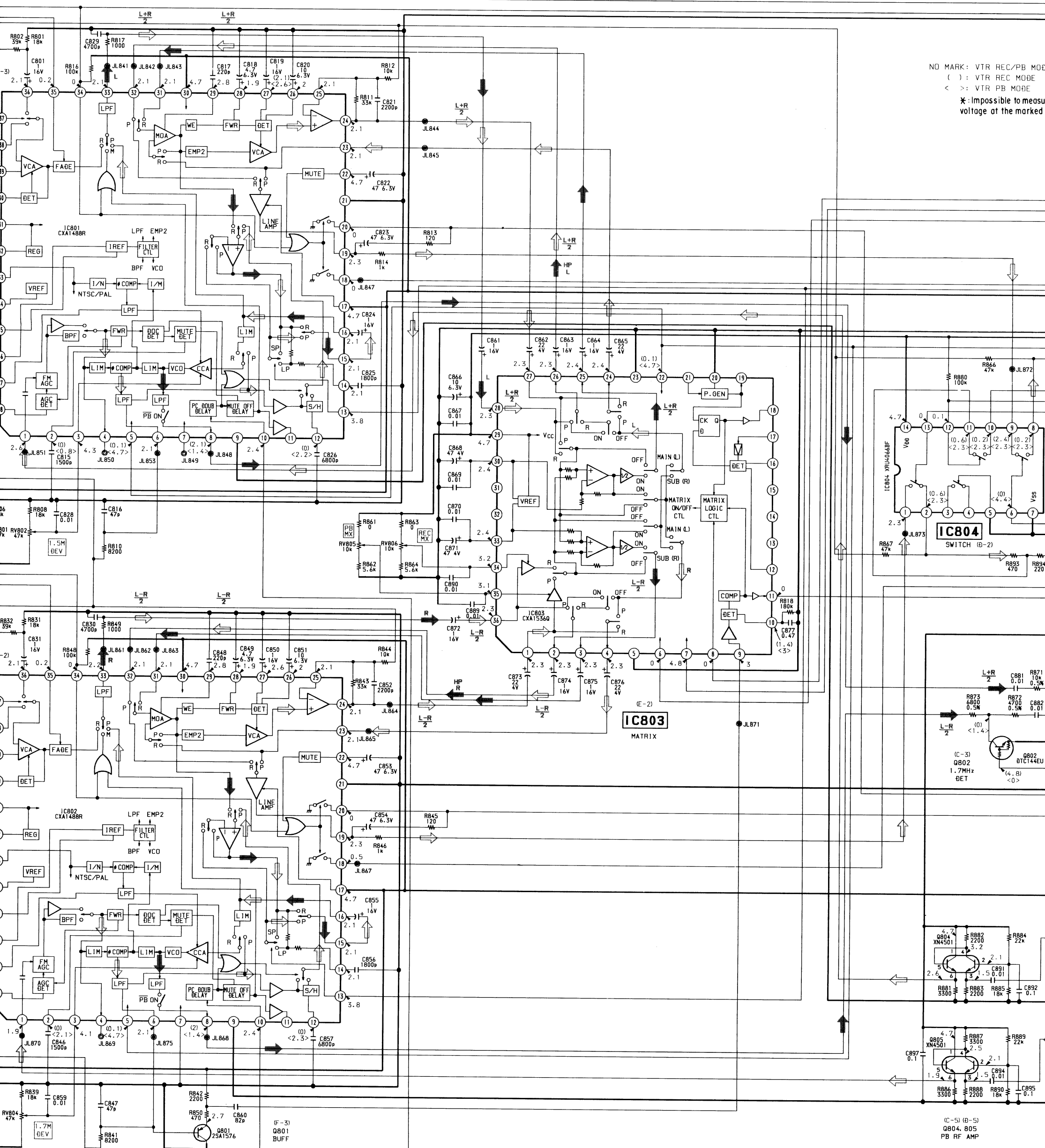
< TRANSISTOR >

Q901	8-729-822-97	2SC4211-5. 6. 7
Q902	8-729-823-00	2SA1622-5. 6. 7
Q903	8-729-822-97	2SC4211-5. 6. 7
Q904	8-729-823-00	2SA1622-5. 6. 7
Q905	8-729-822-48	FC101
Q906	8-729-822-48	FC101

—Ref. No. AU-121, HL-4, MA-116 and RM-56 BOARDS : 6000 series—



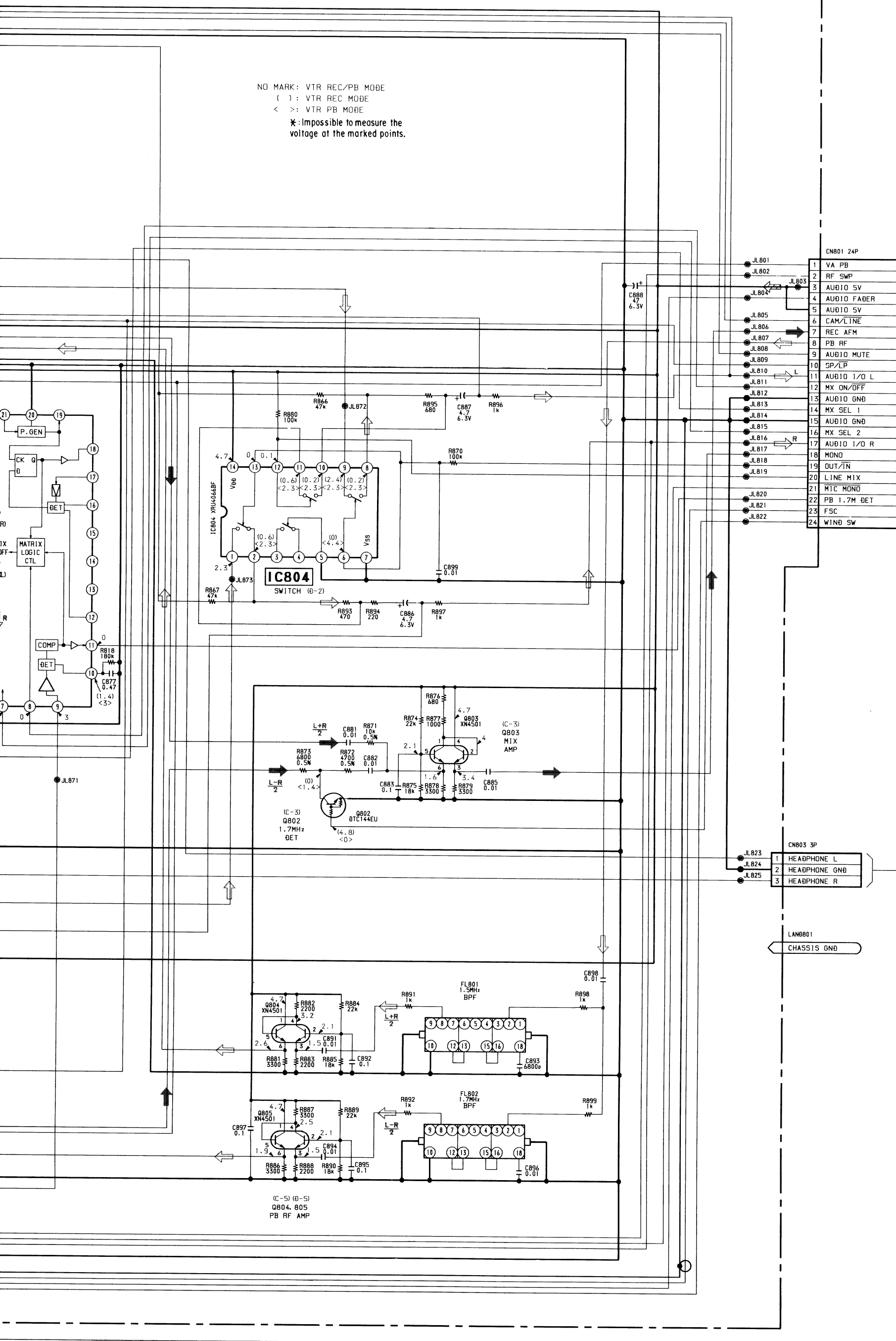


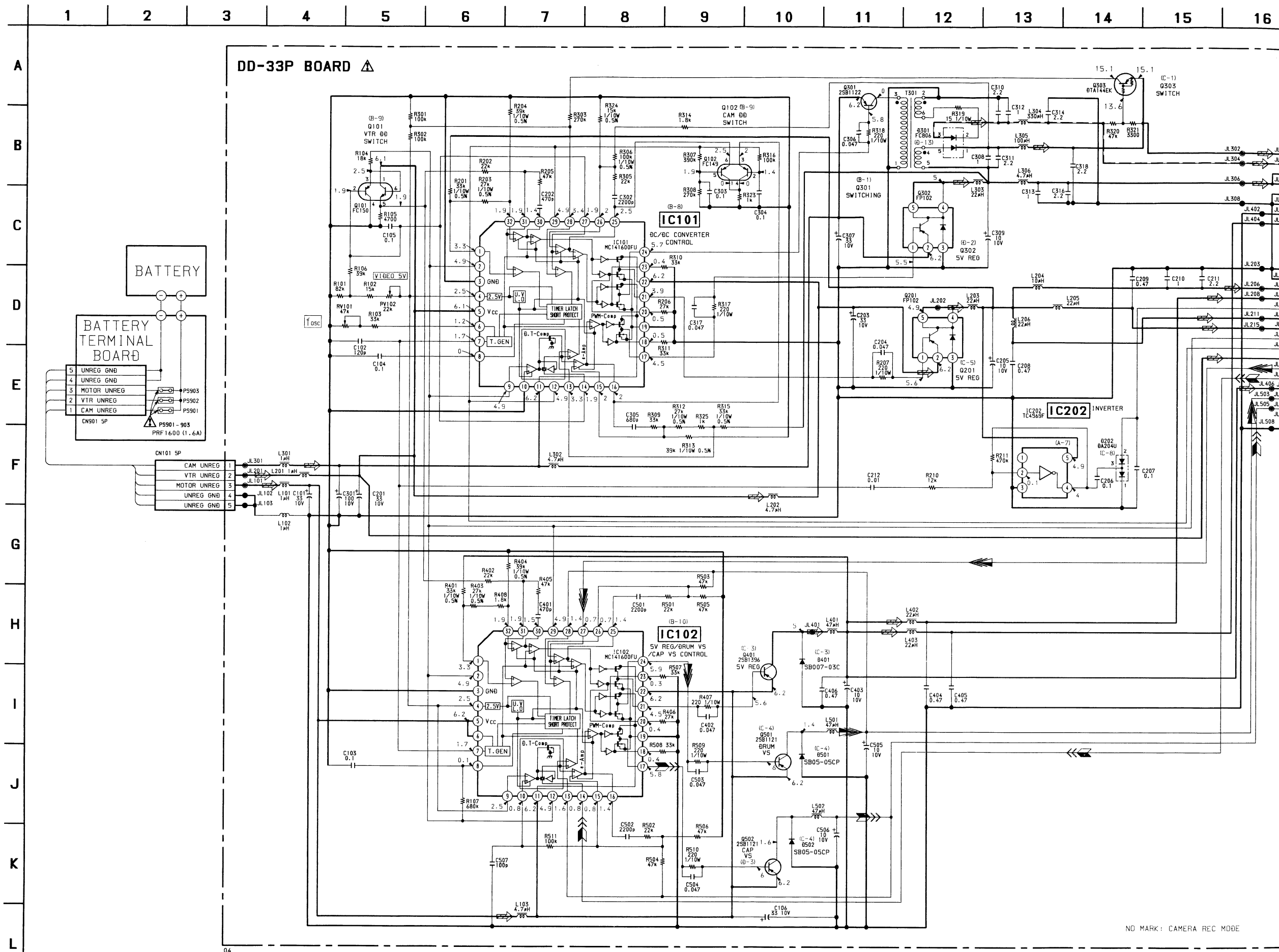


NO MARK: VTR REC/PB MODE

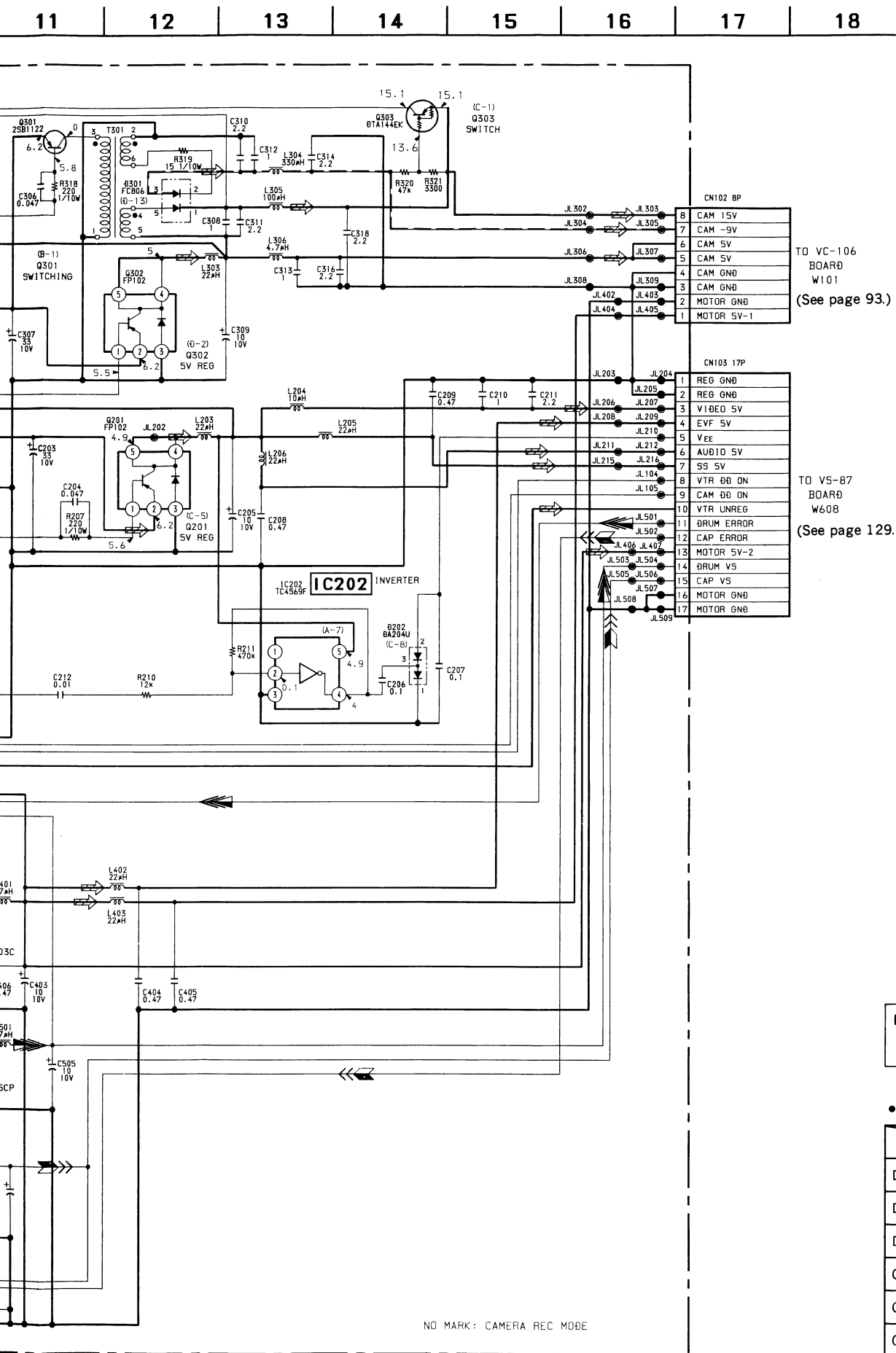
(): VTR REC MODE

< >: VTR PB MODE

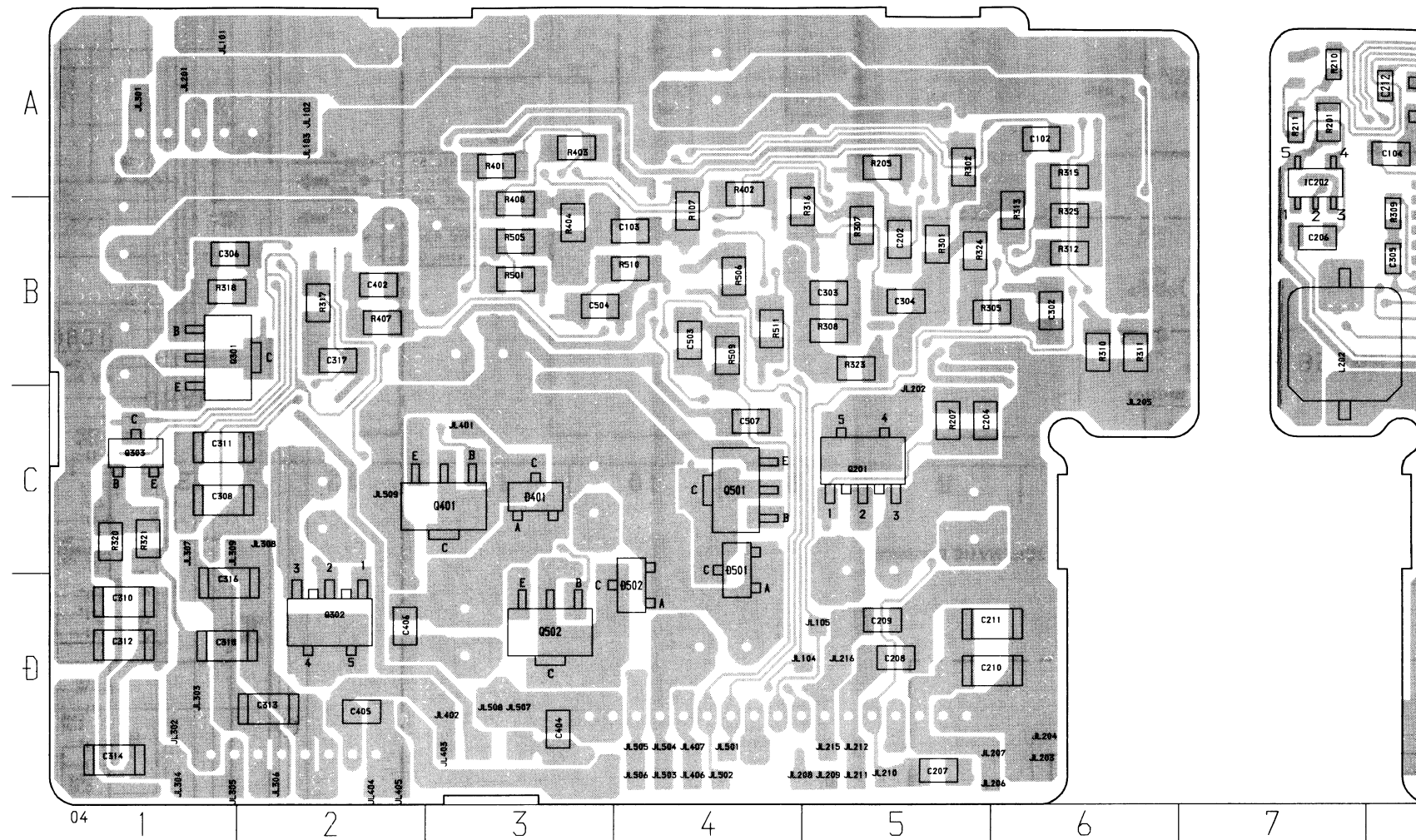
*: Impossible to measure the
voltage at the marked points.



NO MARK : CAMERA REC MODE



DD-33P BOARD (CONDUCTOR SIDE)



< DIODE >

D202	8-719-941-23	DA204U
D301	8-719-989-33	FC806
D401	8-719-941-04	SB007-03CP
D501	8-719-938-75	SB05-05CP
D502	8-719-938-75	SB05-05CP

< IC >

IC101	8-759-035-98	MC141600FU
IC102	8-759-035-98	MC141600FU
IC202	8-759-209-57	TC4S69F

< TRANSISTOR >

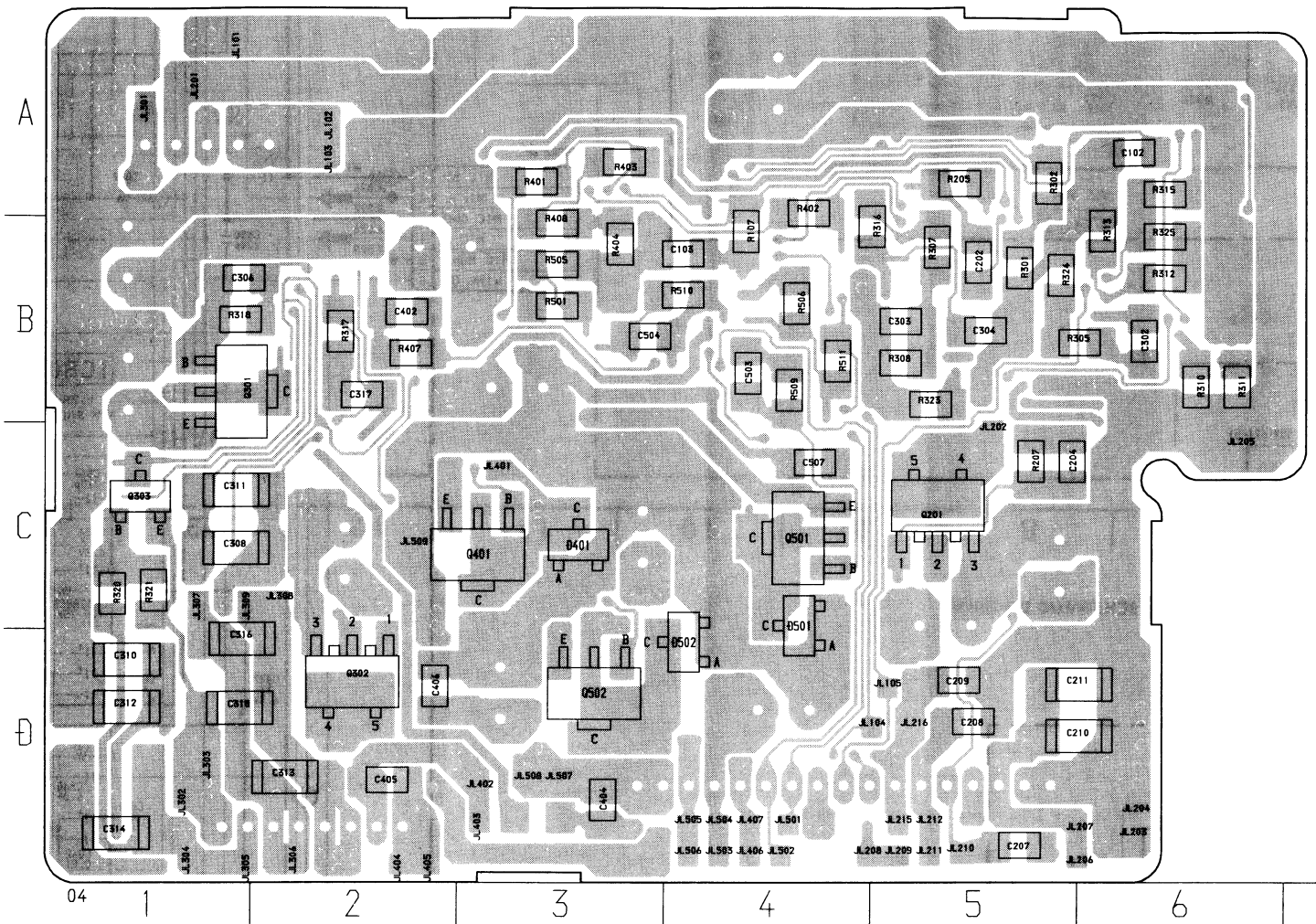
Q101	8-729-823-93	FC150
Q102	8-729-823-95	FC149
Q201	8-729-823-84	FP102
Q301	8-729-804-41	2SB1122-S
Q302	8-729-823-84	FP102
Q303	8-729-901-06	DTA144EK
Q401	8-729-012-63	2SB1396-S/T/U
Q501	8-729-805-25	2SB1121
Q502	8-729-805-25	2SB1121

Note: The components identified by mark  or dotted line with mark  are critical for safety. Replace only with part number specified.

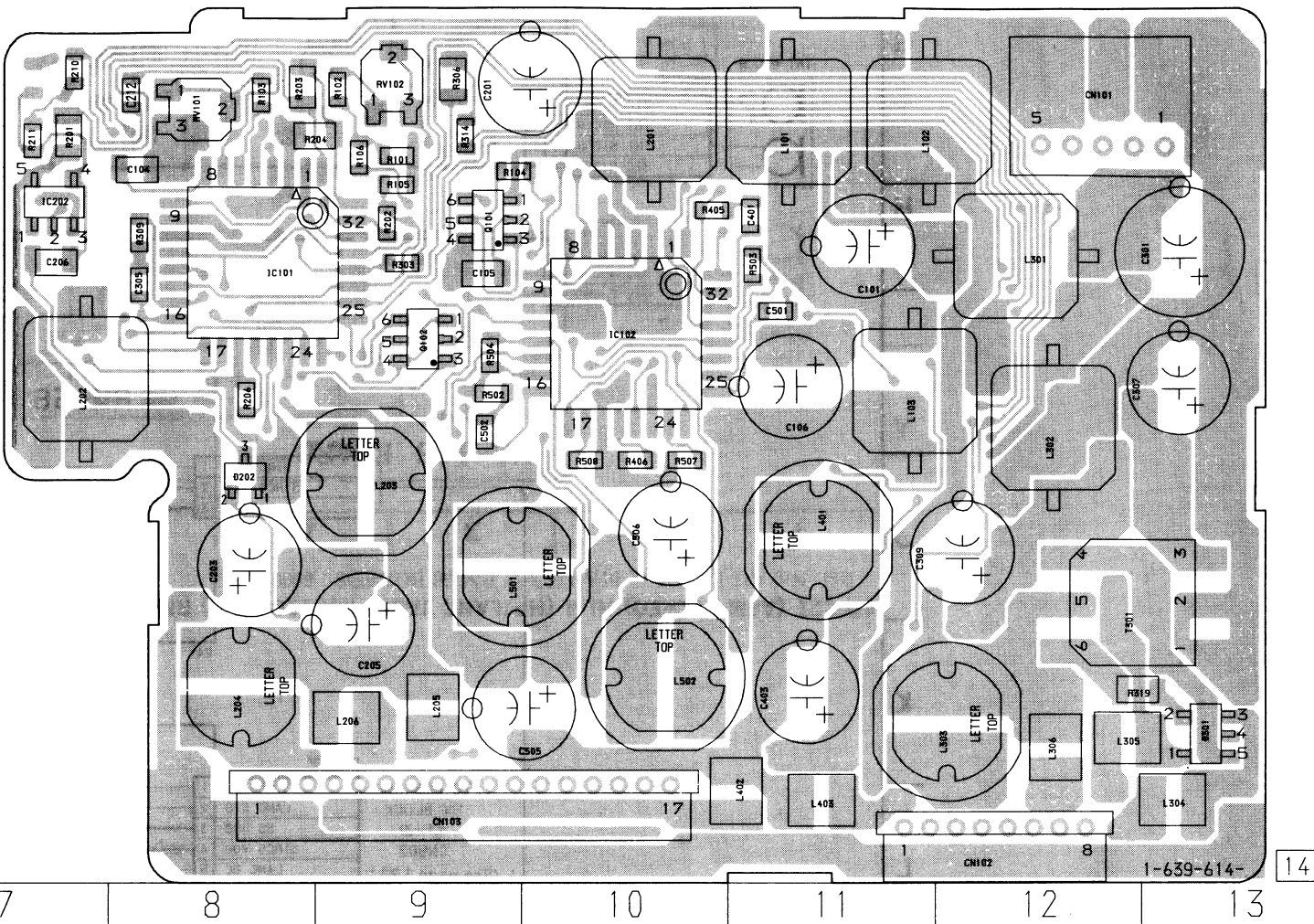
• Signal path

	REC	REC/PB	PB
Drum speed servo			
Drum phase servo			
Drum servo(speed and phase)			
Capstan speed servo			
Capstan phase servo			
Capstan servo(speed and phase)			

DD-33P BOARD (CONDUCTOR SIDE)



DD-33P BOARD (COMPONENT SIDE)



components identified by mark  or dotted with mark  are critical for safety. Place only with part number specified.

	REC	REC/PB	PB
servo			
servo			
speed and phase)			
ed servo			
se servo			
o(speed and phase)			

< DIODE >
D202 8-719-941-23 DA204U
D301 8-719-989-33 FC806
D401 8-719-941-04 SB007-03CP
D501 8-719-938-75 SB05-05CP
D502 8-719-938-75 SB05-05CP

< IC >
IC101 8-759-035-98 MC141600FU
IC102 8-759-035-98 MC141600FU
IC202 8-759-209-57 TC4S69F

< TRANSISTOR >
Q101 8-729-823-93 FC150
Q102 8-729-823-95 FC149
Q201 8-729-823-84 FP102
Q301 8-729-804-41 2SB1122-S
Q302 8-729-823-84 FP102
Q303 8-729-901-06 DTA144EK
Q401 8-729-012-63 2SB1396-S/T/U
Q501 8-729-805-25 2SB1121
Q502 8-729-805-25 2SB1121

—Ref. No. VF-40P BOARD : 7000 series—



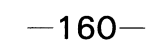
Note: The components identified by mark or dotted line with mark are critical for safety. Replace only with part number specified.

—Ref. No. VF-40P BOARD : 7000 series—

A

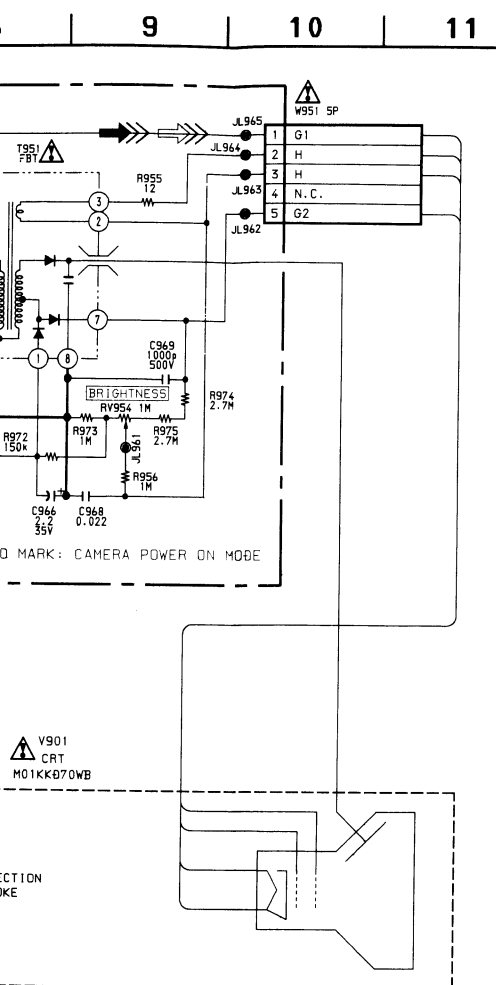


D

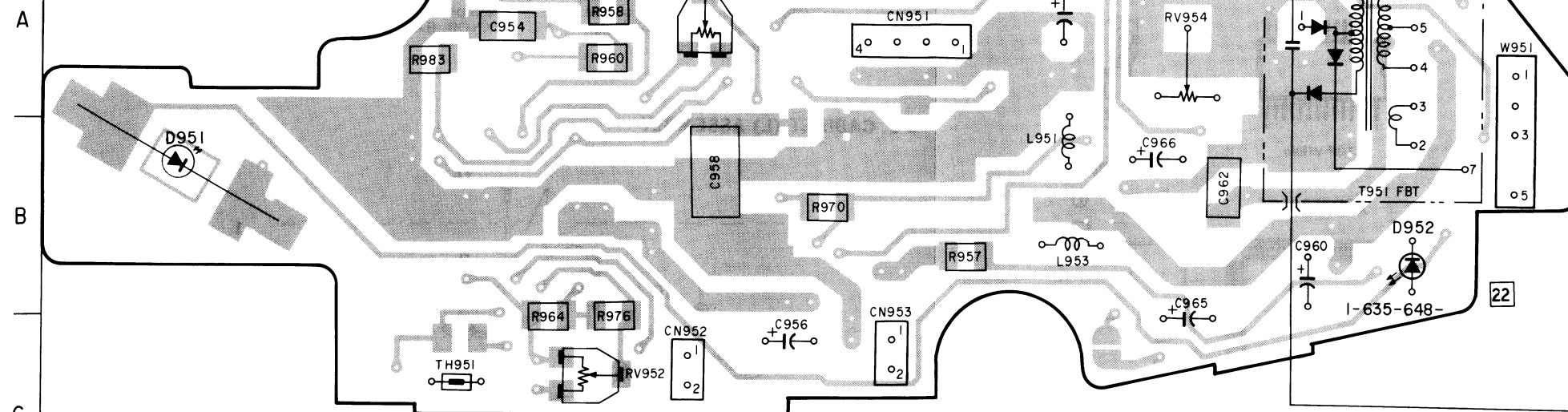


VF-40P (VIEW FINDER) PRINTED WIRING BOARD

—Ref. No. VF-40P BOARD : 7000 series—



VF-40P BOARD (COMPONENT SIDE)



< DIODE >

D951 8-719-820-65 TLS221
D952 8-719-984-02 BR4371F
D953 8-719-400-20 MA152WA-TX

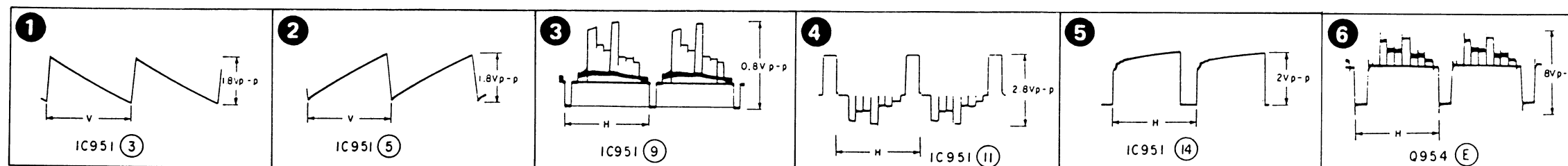
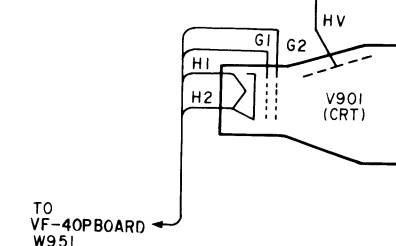
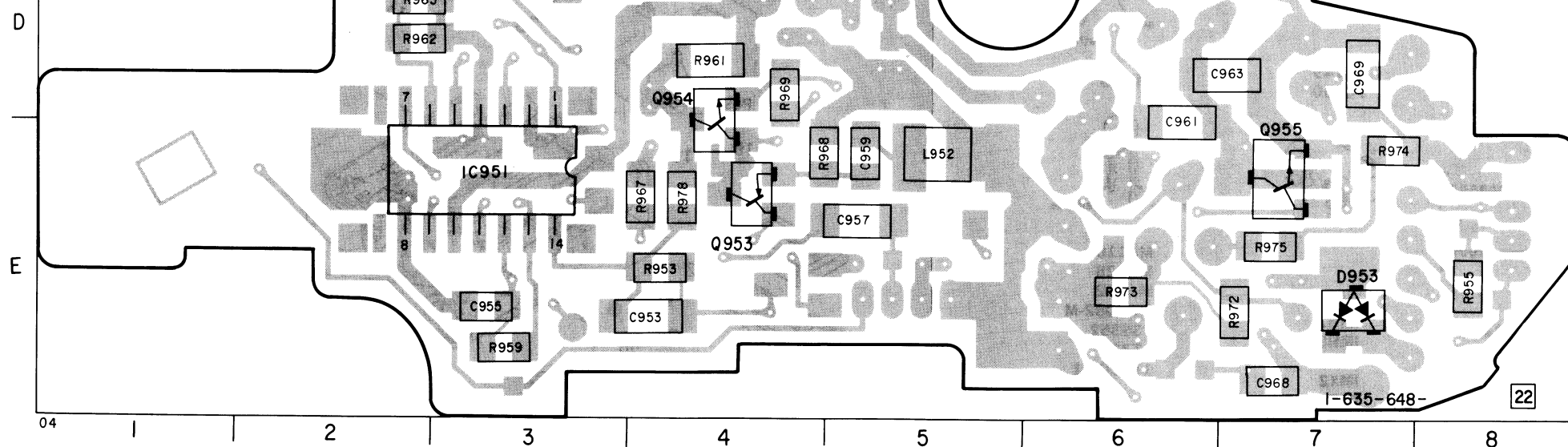
< IC >

IC951 8-759-420-01 AN2512S

< TRANSISTOR >

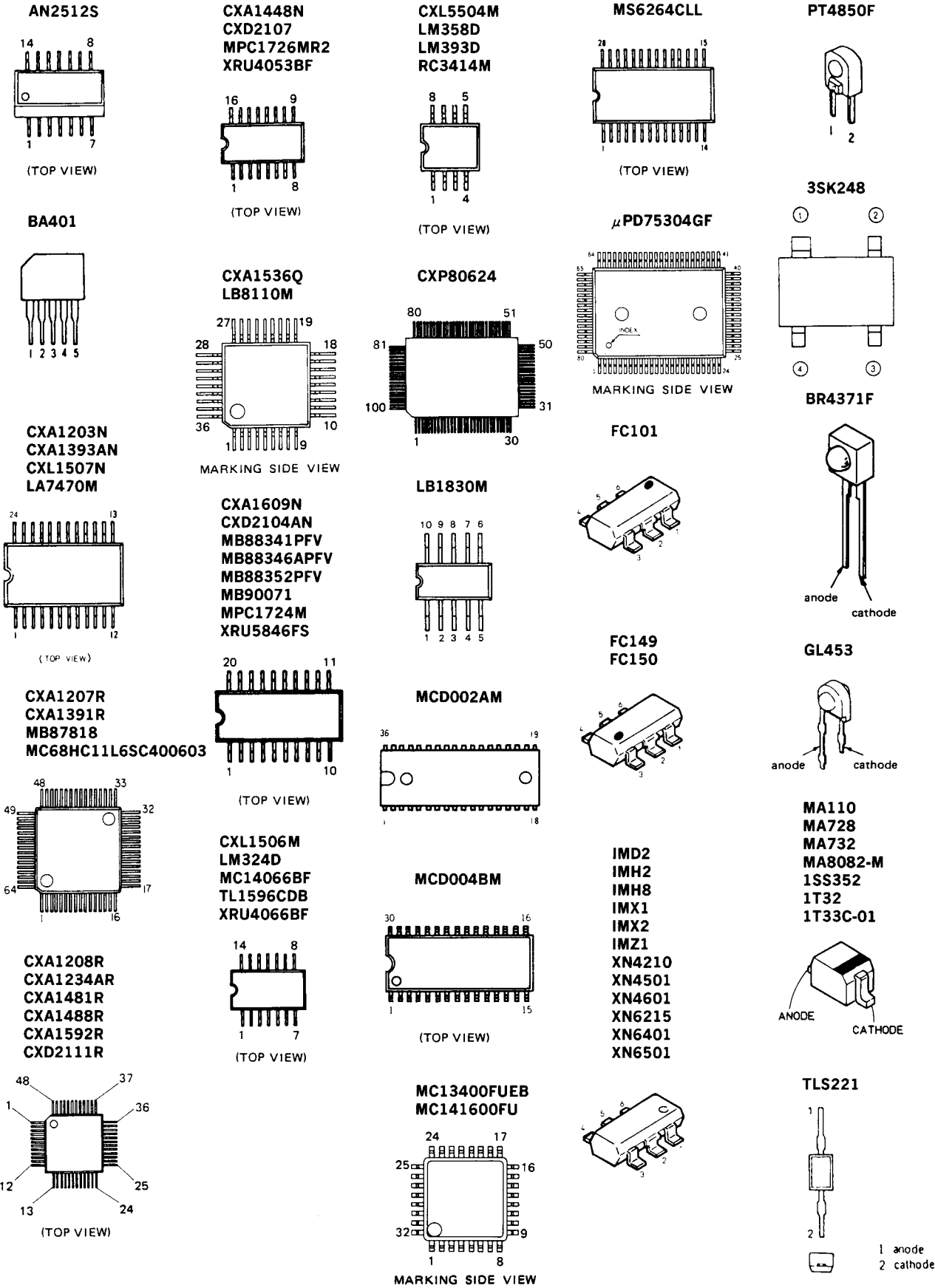
Q953 8-729-216-22 2SA1162
Q954 8-729-100-67 2SC1623-L7
Q955 8-729-106-68 2SD1615A-GP

VF-40P BOARD (CONDUCTOR SIDE)



SECTION 5
EXPLODED VIEWS

4-3. SEMICONDUCTORS

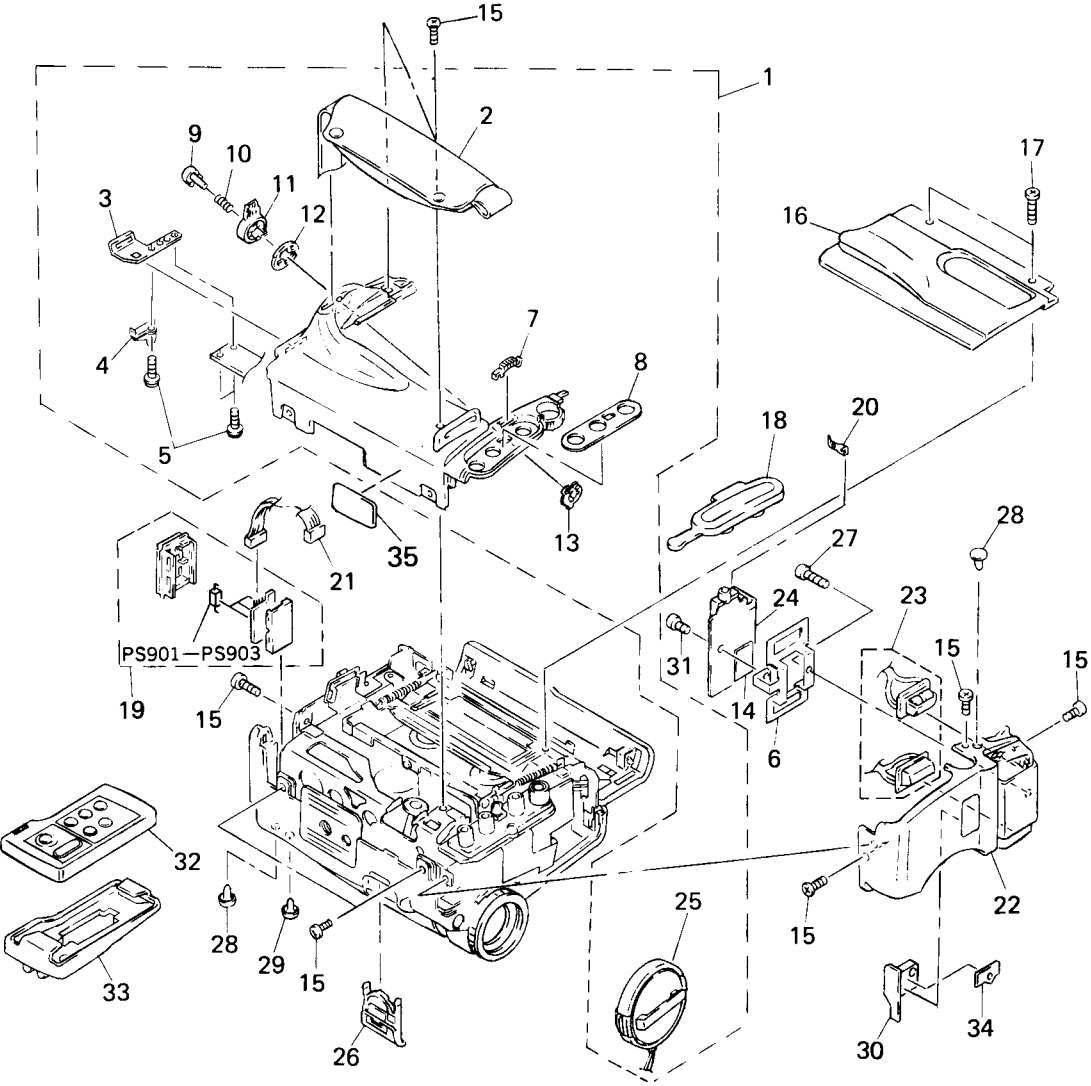


NOTE:

- The mechanical parts with no reference number in the exploded views are not supplied.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- -XX, -X mean standardized parts, so they may have some differences from the original one.
- Color Indication of Appearance Parts
Example:
KNOB, BALANCE (WHITE)...(RED)
Parts Color Cabinet's Color
- Hardware(# mark) list is given in the last of this parts list.

The components identified by mark or dotted line with mark are critical for safety. Replace only with part number specified.

5-1. CABINET (L) ASSEMBLY

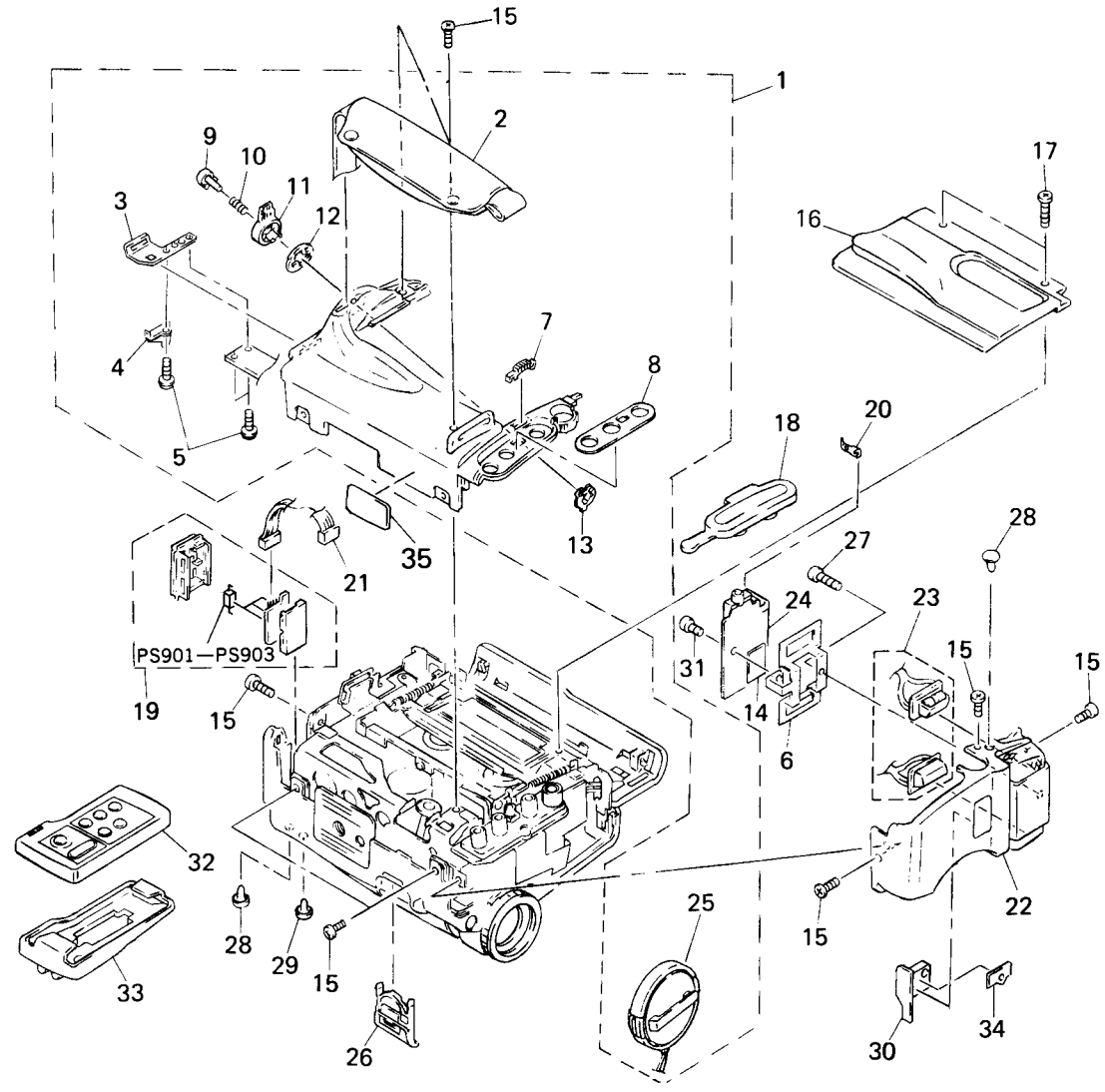


SECTION 5
EXPLODED VIEWS

NOTE:

- The mechanical parts with no reference number in the exploded views are not supplied.
 - Items marked “*” are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- -XX, -X mean standardized parts, so they may have some differences from the original one.
 - Color Indication of Appearance Parts
Example:
KNOB, BALANCE (WHITE)...(RED)
Parts Color Cabinet's Color
- Hardware(#mark) list is given in the last of this parts list.
- The components identified by mark  or dotted line with mark  are critical for safety. Replace only with part number specified.

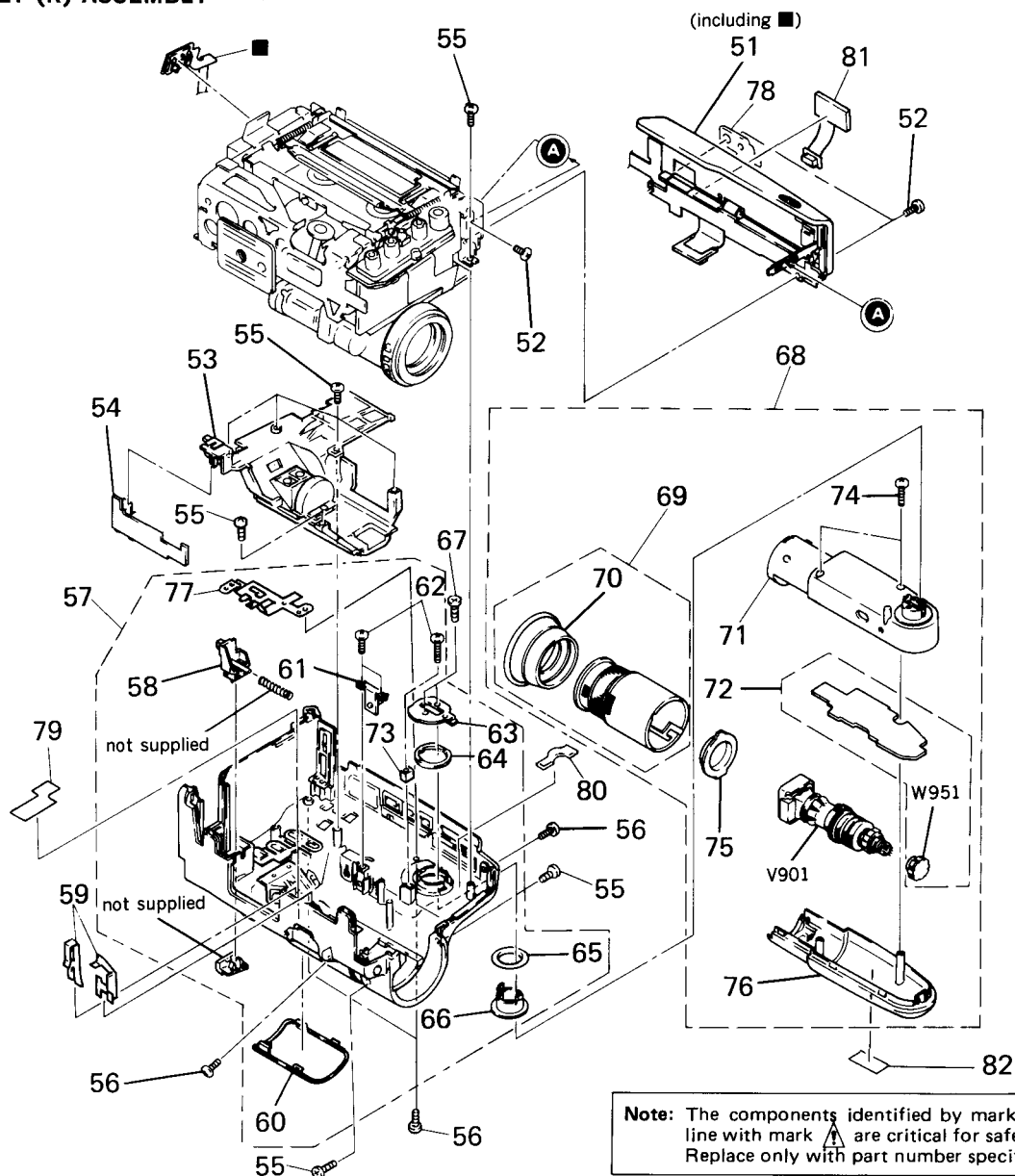
5-1. CABINET (L) ASSEMBLY



Ref.No.	Part No.	Description	Remark
1	A-7081-733-A	CABINET (L) BLOCK ASSY (E, AUS)	
1	A-7081-762-A	CABINET (L) BLOCK ASSY (AEP, UK)	
2	3-736-807-01	BELT, GRIP	
3	3-736-338-01	BRACKET, BELT	
4	3-736-360-01	JOINT, LR	
5	3-669-480-11	+ PTPWH 2	
6	* 3-942-954-01	BRACKET, MA	
7	3-749-704-01	LID, IN OUT (AEP, UK)	
7	3-942-944-01	KNOB, IN OUT (E, AUS)	
8	3-747-134-21	COVER, I/O	
9	3-942-950-01	BUTTON, S/S	
10	3-578-221-00	SPRING, COMPRESSION	
11	3-942-985-01	KNOB, STAND-BY	
12	3-736-364-01	SPRING	
13	3-942-953-01	HOLDER, STAND-BY KNOB	
14	* 3-943-853-01	SHEET, MA	
15	3-719-381-01	SCREW (M2X4)	
16	X-3940-992-1	LID ASSY, CASSETTE	
17	3-727-902-11	SCREW (M1.4), SPECIAL	
18	3-942-986-01	COVER, JACK	
19	1-537-297-31	TERMINAL BOARD, BATTERY	

Ref.No.	Part No.	Description	Remark
20	* 3-942-941-01	PLATE (F), GROUND	
21	1-944-055-11	HARNESS (CD-26)	
22	X-3940-923-1	PANEL ASSY, F	
23	A-7091-657-A	MICROPHONE UNIT	
24	A-7062-907-A	MA-116 BOARD, COMPLETE	
25	A-7091-564-A	CAP BLOCK ASSY, LENS	
26	3-942-951-01	LID, BATTERY CASE, LITHIUM	
27	3-719-601-01	SCREW (B2X5), TAPPING	
28	3-728-267-01	COVER, 3.5 JACK	
29	3-728-266-01	COVER, 2.5 JACK	
30	A-7071-473-A	RM-56 BOARD, COMPLETE	
31	3-713-786-51	SCREW (M2X3)	
32	1-465-934-11	REMOTE COMMANDER (CAM CORDER) (RMT-504)	
33	3-943-154-01	HOLDER, REMOTE CONTROL	
34	* 3-943-854-01	PLATE, LIGHT INTERCEPTION	
35	* 3-944-103-01	LABEL, MODEL NUMBER (AEP)	
35	* 3-944-104-01	LABEL, MODEL NUMBER (UK, E, AUS)	
PS901		1-532-841-21 LINK, IC PRF1600 (1.6A)	
PS902		1-532-841-21 LINK, IC PRF1600 (1.6A)	
PS903		1-532-841-21 LINK, IC PRF1600 (1.6A)	

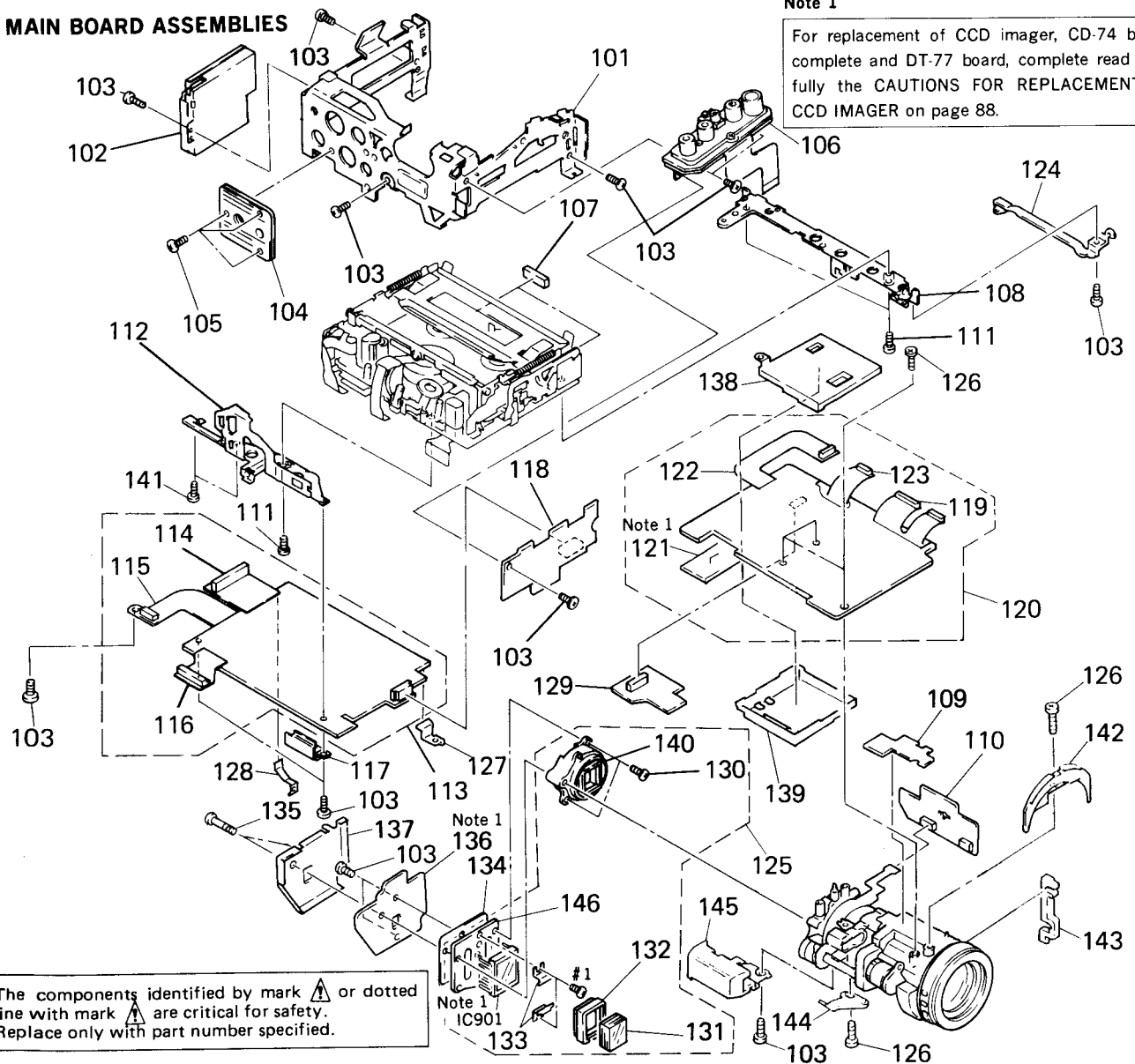
5-2. CABINET (R) ASSEMBLY



Ref. No.	Part No.	Description	Remark
51	1-466-559-51	SWITCH BLOCK, CONTROL (FK-3) (E, AUS)	
51	1-466-605-11	SWITCH BLOCK, CONTROL (FK-3) (AEP, UK)	
52	3-713-786-51	SCREW (M2X3)	
53	1-466-560-41	SWITCH BLOCK, CONTROL (CF-3)	
54	A-7071-474-A	HL-4 BOARD, COMPLETE	
55	3-719-408-01	SCREW (B2), TAPPING, P3	
56	3-719-381-01	SCREW (M2X4)	
57	A-7081-760-A	CABINET (R) BLOCK ASSY (AEP, UK)	
57	A-7081-858-A	CABINET (R) BLOCK ASSY (E, AUS)	
58	3-747-164-01	LEVER, RELEASE	
59	1-537-370-11	TERMINAL BOARD, LB	
60	3-942-974-41	LID, SLIDE	
61	X-3747-701-1	PIN ASSY, EVF LOCK	
62	3-719-601-01	SCREW (B2X5), TAPPING	
63	3-747-111-01	PLATE, LOCK, TILT	
64	3-747-110-01	SPRING, LEAF, TILT	
65	3-747-112-01	RING, TILT	
66	3-747-109-01	SLEEVE, EVF	

Ref. No.	Part No.	Description	Remark
67	3-740-546-01	SCREW (M2X10)	
68	* A-7019-262-A	EVF COMPLETE ASSY	
69	A-7081-256-A	HOLDER BLOCK ASSY, FINDER	
70	3-736-370-01	EYE CUP	
71	X-3747-704-1	CABINET (L) ASSY, EVF	
72	* A-7062-393-A	VF-40P BOARD, COMPLETE	
73	3-747-178-01	REINFORCEMENT, TILT LOCK	
74	3-713-790-31	SCREW (M2X8), TAPPING, P3	
75	3-747-116-01	COVER, CRT	
76	3-747-745-01	CABINET (R), EVF	
77	3-943-149-01	PLATE, GROUND, LOCK PIN	
78	3-944-112-01	PLATE, GROUND, LCD	
79	3-943-805-01	SHEET (R), ACOUSTIC ABSORBENT	
80	3-943-809-01	CUSHION, EC	
81	1-809-425-21	DISPLAY PANEL, LIQUID CRYSTAL	
82	* 3-704-235-01	LABEL, CAUTION (UK)	
V901	△ 1-452-565-11	CRT ASSY	
W951	△ 1-540-019-21	SOCKET ASSY, CRT	

5-3. MAIN BOARD ASSEMBLIES



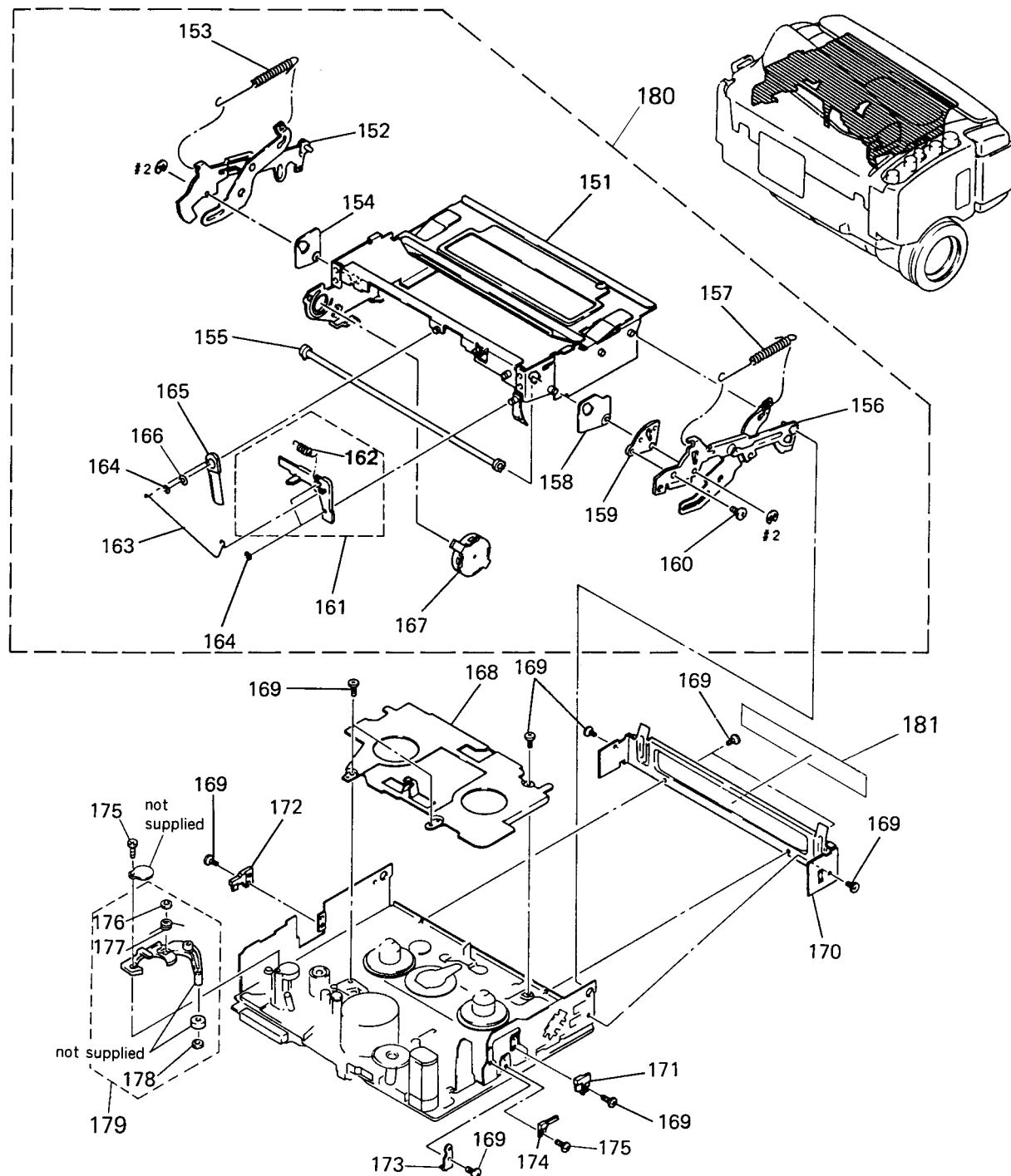
Note 1

For replacement of CCD imager, CD-74 board, complete and DT-77 board, complete read carefully the CAUTIONS FOR REPLACEMENT OF CCD IMAGER on page 88.

Note: The components identified by mark  or dotted line with mark  are critical for safety. Replace only with part number specified.

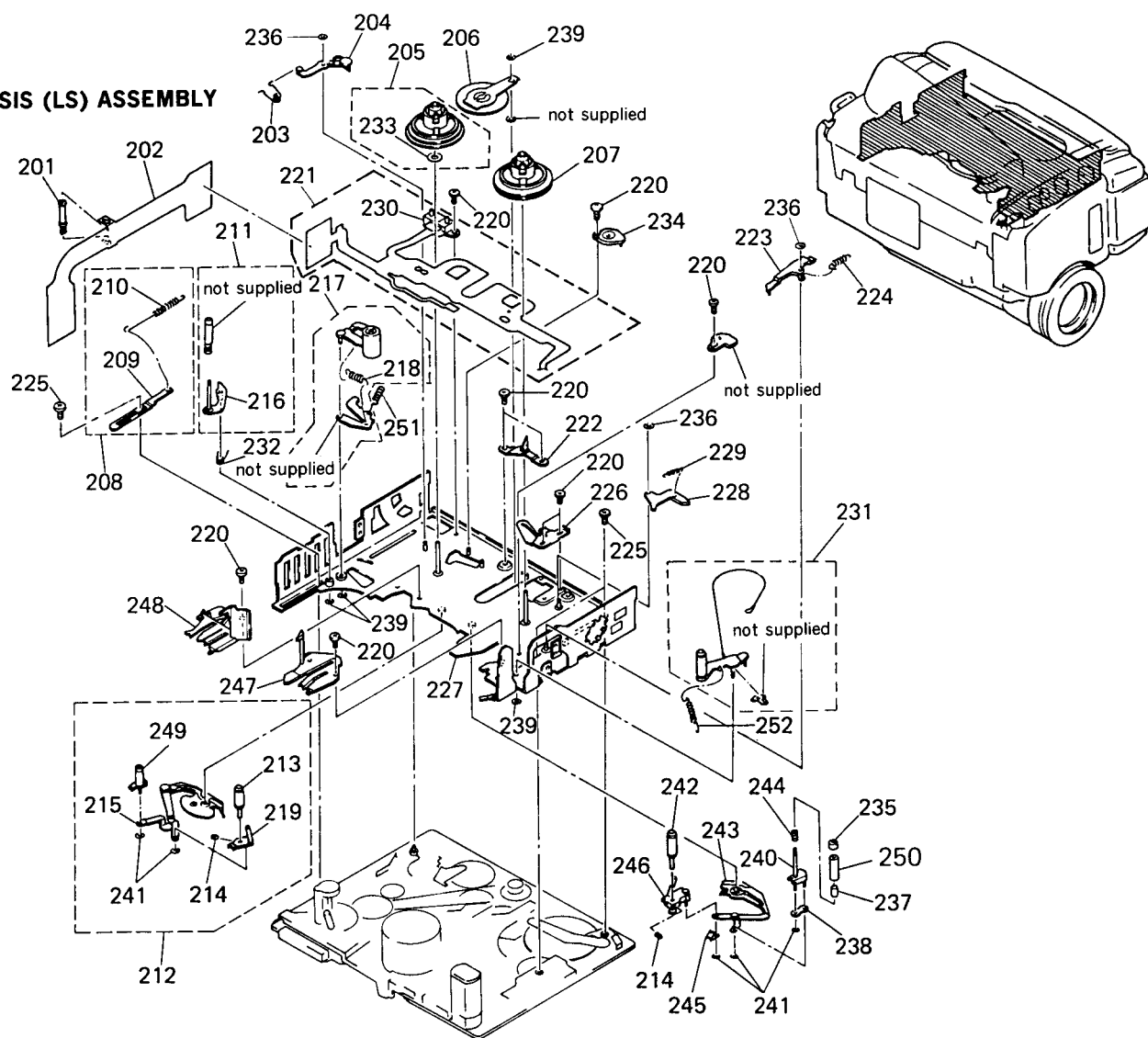
Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
101	X-3940-684-1	FRAME ASSY, MD		125	* A-7030-270-A	CCD ASSY	
102	 A-7062-903-A	DD-33P BOARD, COMPLETE		126	3-719-601-01	SCREW (B2X5), TAPPING	
103	3-713-786-51	SCREW (M2X3)		127	* 3-736-324-01	PLATE (LEFT), VS GROUND	
104	3-736-396-02	SCREW, TRIPOD		128	* 3-942-939-01	PLATE (R), GROUND, VS	
105	3-719-381-01	SCREW (M2X4)		129	A-7062-904-A	TI-40 BOARD, COMPLETE	
106	1-537-373-11	JACK BOARD ASSY		130	3-738-519-11	SCREW (M2X3), +B	
107	* 3-736-841-02	SPACER, FK		131	1-547-381-12	FILTER BLOCK, OPTICAL (OFB-02-03)	
108	3-942-983-01	FRAME (UPPER)		132	* 3-725-177-01	RUBBER, SEAL	
109	3-943-806-01	SHEET (VC), ACOUSTIC ABSORBENT		133	* 3-725-175-01	STOPPER, CCD	
110	A-7062-902-A	LD-51 BOARD, COMPLETE		134	* 3-725-180-01	SHEET, INSULATING, CCD HOLDER	
111	3-719-381-31	SCREW (M2X3)		135	3-747-151-01	SCREW (2X16)	
112	X-3940-683-1	FRAME (LOWER) ASSY		136	A-7071-475-A	CD-74 BOARD, COMPLETE (Note. 1)	
113	A-7062-901-A	VS-87 BOARD, COMPLETE		137	* 3-942-952-01	CASE, SHIELD, CD	
114	1-639-616-11	FP-381 FLEXIBLE BOARD		138	* 3-942-977-01	CASE (LOWER), SHIELD, VC	
115	1-639-617-11	FP-382 FLEXIBLE BOARD		139	* 3-942-976-01	CASE (UPPER), SHIELD, VC	
116	1-630-591-11	FP-182 FLEXIBLE BOARD		140	3-725-176-11	HOLDER, CCD	
117	* 3-942-936-01	SHIELD, RP CONNECTOR		141	3-704-197-21	SCREW (M1.4X2.5), LOCKING	
118	A-7062-906-A	AU-121 BOARD, COMPLETE		142	3-942-981-01	PLATE, BLIND, F PANEL	
119	1-639-615-11	FP-379 FLEXIBLE BOARD		143	3-943-807-01	MAFLER, LENS	
120	A-7062-905-A	VC-106 BOARD, COMPLETE		144	3-942-940-01	HOLDER, LENS	
121	A-7068-194-A	HIC DT-77 BOARD, COMPLETE (HIC101) Note. 1		145	3-943-569-01	CASE, ACOUSTIC ABSORBENT	
122	1-639-618-11	FP-383 FLEXIBLE BOARD		146	3-739-877-11	ADAPTOR, CCD FITTING	
123	1-639-623-11	FP-380 FLEXIBLE BOARD		IC901	8-752-606-77	IC ICX039BNA-2 (CCD IMAGER) (Note. 1)	
124	X-3940-856-1	REINFORCEMENT ASSY, VF					

5-4. CASSETTE COMPARTMENT ASSEMBLY



Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
151	X-3940-719-1	CASSETTE COMPARTMENT HOLDER ASSY (4)		167	X-3739-809-1	DAMPER ASSY (2)	
152	X-3940-718-1	ARM (T) ASSY (4), F		168	3-728-227-01	BASE, LED	
153	3-739-872-01	SPRING, TENSION		169	3-728-103-11	SCREW (M1.4X1.6), SPECIAL HEAD	
154	3-728-145-01	BEARING (T), MIDWAY GEAR		170	3-943-055-01	FRAME (L), LS	
155	X-3727-920-1	GEAR ASSY, MIDWAY		171	3-727-957-01	HOLDER (S), SENSOR	
156	X-3940-717-1	ARM (S) ASSY (4), F		172	3-727-954-01	HOLDER (T), SENSOR	
157	3-739-873-01	SPRING, TENSION		173	3-727-946-01	SUPPORT, LS	
158	3-728-146-01	BEARING (S), MIDWAY GEAR		174	1-572-611-11	SWITCH, LEAF	
159	3-739-808-01	PLATE (2), ADJUSTMENT, C ARM		175	3-728-148-11	SCREW (M1.4X2.5), SPECIAL HEAD	
160	3-728-126-01	SCREW (M1.4X2), SPECIAL HEAD		176	3-943-533-01	WASHER, STOPPER	
161	A-7040-164-A	ARM BLOCK ASSY, TP		177	3-943-439-01	SPRING, TORSION	
162	3-509-127-00	SPRING, TENSION		178	3-321-393-11	WASHER, STOPPER	
163	3-728-277-01	BAR, JOINT		179	A-7040-264-B	ROLLER BLOCK ASSY, HD	
164	3-331-007-11	WASHER		180	A-7040-256-C	CASSETTE COMPARTMENT HOLDER BLOCK ASSY (4)	
165	X-3940-991-1	PROTECTOR ASSY (2), T		181	3-943-701-01	LABEL, CAUTION	
166	3-749-304-01	WASHER, STOPPER					

5-5. CHASSIS (LS) ASSEMBLY

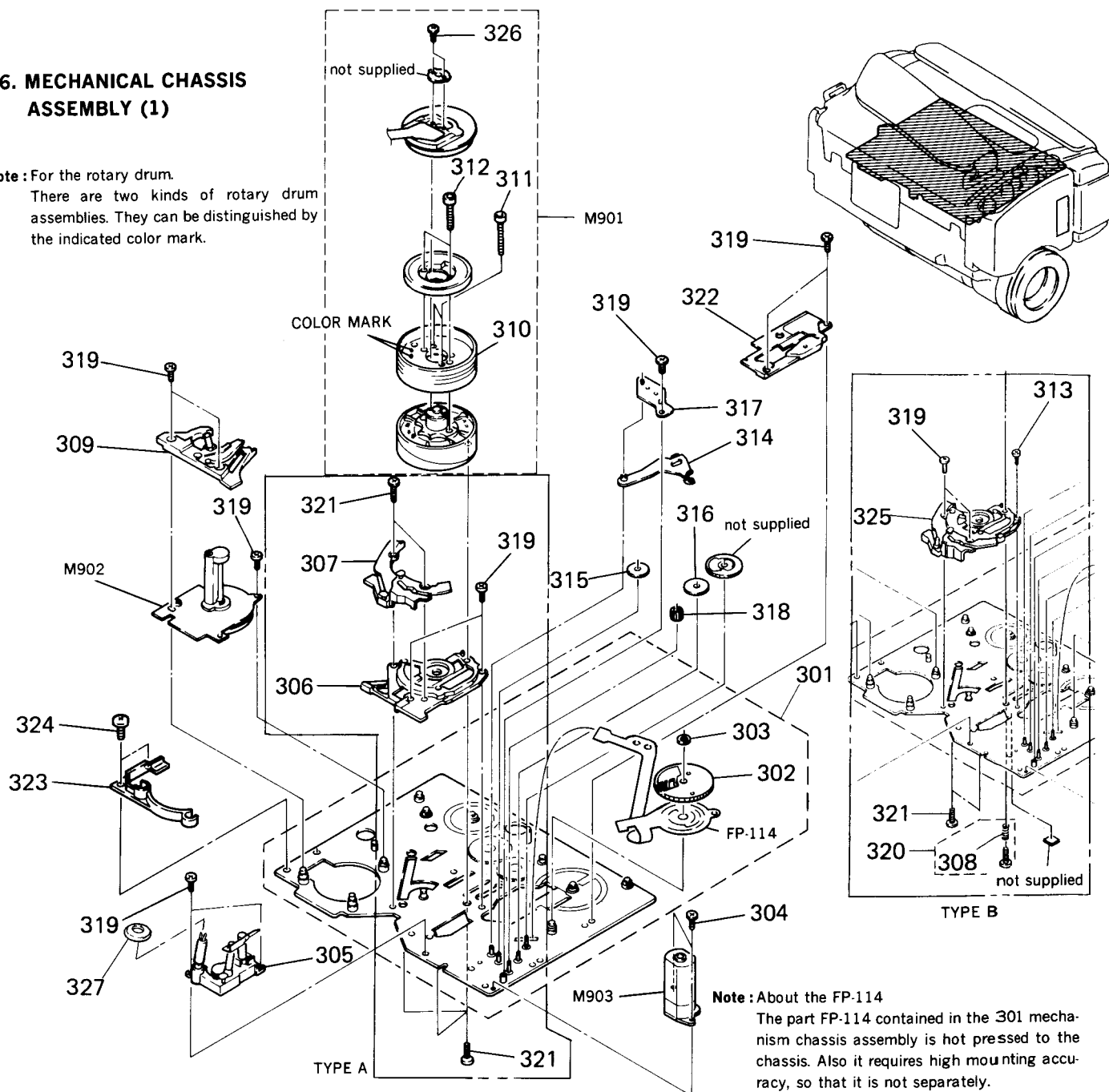


Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
201	3-739-807-01	SHAFT (2), FLEXIBLE ROTARY		227	X-3940-186-1	CHASSIS ASSY (S), LS	
202	1-639-334-11	FP-422 FLEXIBLE BOARD		228	3-732-079-01	ARM (JD), S SOFT	
203	3-732-068-01	SPRING (JD), RATCHET		229	3-732-078-01	SPRING (JD), TENSION	
204	X-3728-005-1	RATCHET ASSY (JD), T		230	1-572-802-12	SWITCH, PUSH (3 KEY)	
205	X-3727-951-2	TABLE ASSY, REEL, TAKE-UP		231	X-3749-001-1	ARM ASSY (JD), TG1	
206	X-3727-926-1	ARM ASSY, GEAR		232	3-727-939-01	SPRING (JD), TORSION	
207	X-3727-952-1	TABLE ASSY, REEL, SUPPLY		233	3-701-439-11	WASHER	
208	A-7040-150-A	SLIDER BLOCK ASSY, CAM		234	X-3727-914-4	CLUTCH ASSY, ONEWAY	
209	3-728-089-01	SLIDER, CAM		235	3-943-822-01	FLANGE (P), TG4 UPPER	
210	3-727-936-01	SPRING, TENSION		236	3-728-091-01	WASHER, STOPPER	
211	A-7040-151-A	ARM BLOCK ASSY, TG11		237	3-728-048-01	SLEEVE, TG4	
212	A-7040-148-A	ARM (T) BLOCK ASSY, GUIDE		238	3-728-053-01	PLATE, UNDER, TG4	
213	X-3727-994-1	ROLLER ASSY, TG8		239	3-315-414-31	WASHER	
214	3-728-290-01	SCREW (M1.2)		240	X-3727-936-2	BASE ASSY, TG4	
215	X-3727-940-1	ARM (T) ASSY, GUIDE		241	3-331-007-11	WASHER	
216	X-3727-913-2	ARM ASSY, TG11		242	X-3940-733-1	ROLLER ASSY (3), TG5	
217	A-7040-240-A	ARM BLOCK ASSY (JD), PINCH		243	X-3727-941-1	ARM (S) ASSY, GUIDE	
218	3-727-927-01	SPRING (POWER TENSION), TENSION		244	3-728-023-01	SPRING, COMPRESSION	
219	X-3727-947-1	BASE ASSY, TG7		245	3-728-062-01	SPRING (6GB), LEAF	
220	3-728-103-11	SCREW (M1.4X1.6), SPECIAL HEAD		246	X-3727-948-1	BASE ASSY, TG6	
221	A-7062-792-A	FP-423 BOARD, COMPLETE		247	3-728-226-01	RAIL (S) (JD), GUIDE	
222	X-3940-087-1	BASE ASSY, RL		248	3-728-244-01	RAIL (T), GUIDE	
223	3-732-077-01	RATCHET (JD), S		249	X-3728-004-1	ROLLER ASSY (2), TG8	
224	3-732-076-01	SPRING (JD), TENSION		250	3-945-146-01	ROLLER (LV), TG4	
225	3-941-601-01	SCREW (M1.4X2.5), SPECIAL HEAD		251	3-732-089-01	SPRING (JD), TENSION	
226	3-728-206-01	PLATE, CAM, LS		252	3-940-616-03	SPRING (JD), TENSION	

5-6. MECHANICAL CHASSIS ASSEMBLY (1)

Note : For the rotary drum.

There are two kinds of rotary drum assemblies. They can be distinguished by the indicated color mark.

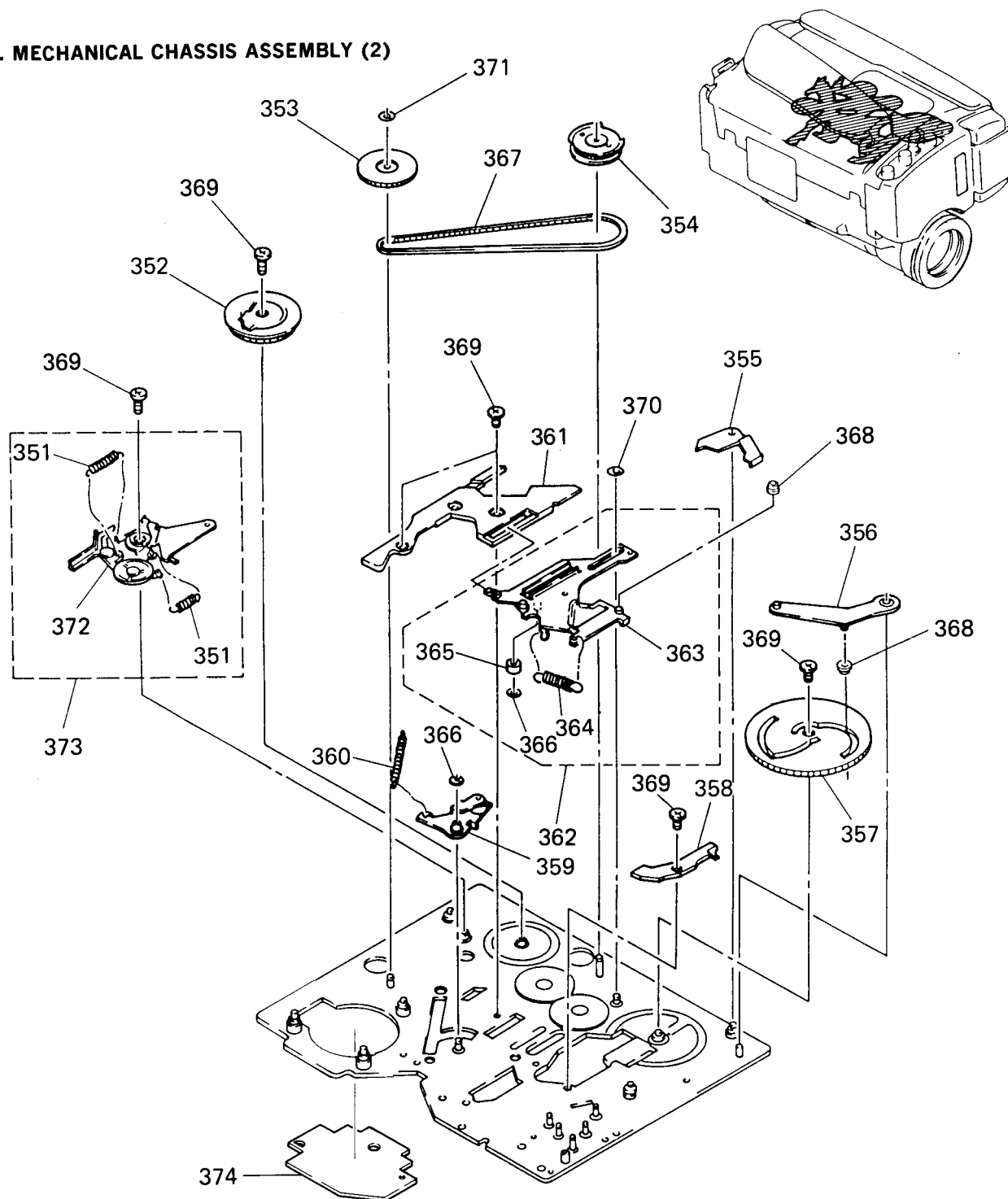


Note: About the FP-114

The part FP-114 contained in the 301 mechanism chassis assembly is not pressed to the chassis. Also it requires high mounting accuracy, so that it is not separately.

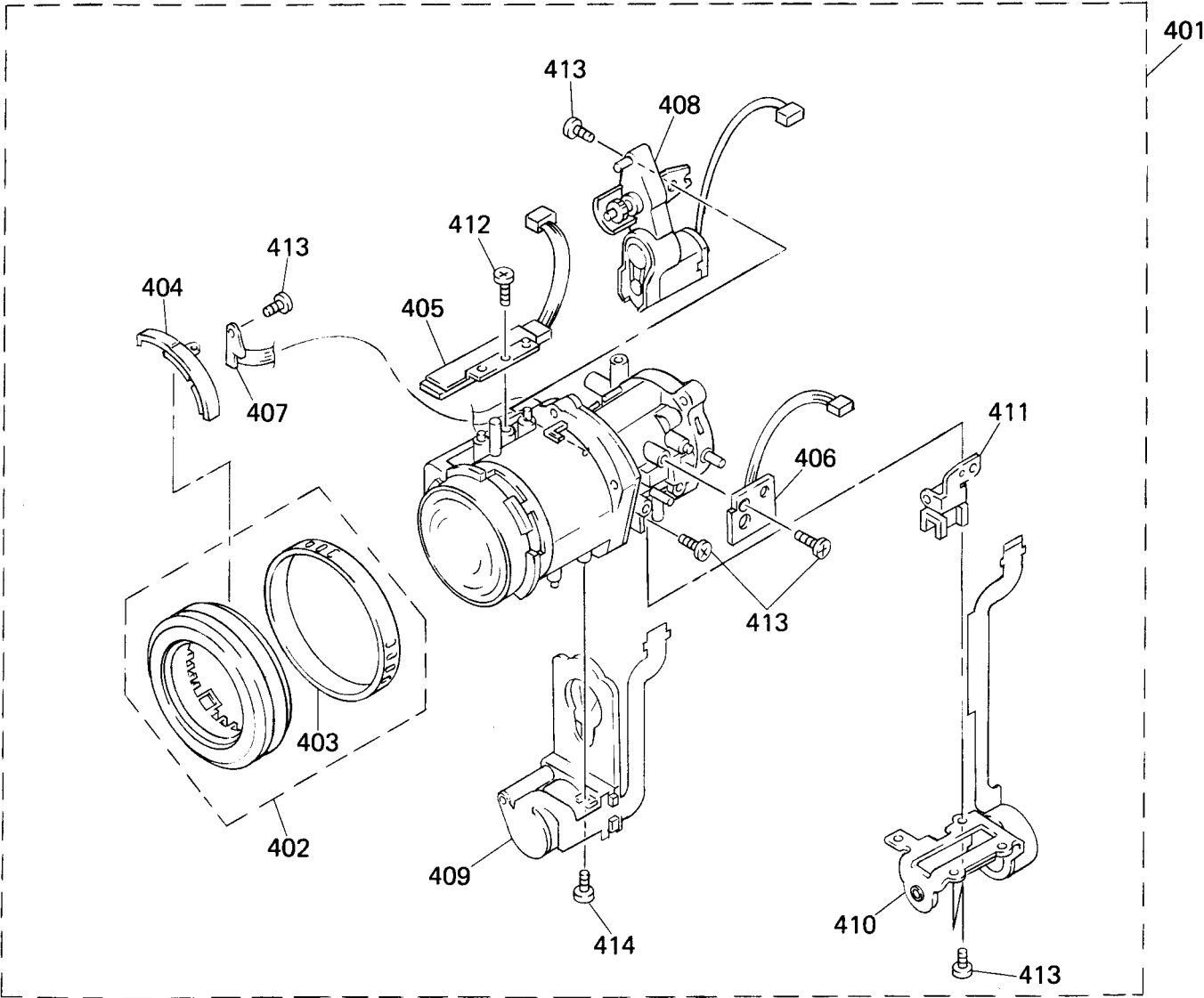
Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
301	A-7040-154-P	CHASSIS ASSY, MECHANICAL		315	X-3727-903-1	GEAR ASSY, NO. 1	
302	X-3727-915-1	GEAR ASSY, MODE		316	X-3727-904-1	GEAR ASSY, NO. 2	
303	3-325-290-21	WASHER, STOPPER		317	3-728-119-01	RETAINER, GEAR	
304	3-732-087-31	SCREW (M1.4X1.8), SPECIAL HEAD		318	3-728-149-01	GEAR, NO. 0	
305	A-7040-251-A	BASE (1) BLOCK ASSY (3), RAIL		319	3-728-148-11	SCREW (M1.4X2.5), SPECIAL HEAD	
306	X-3727-997-4	BASE (M) ASSY, DRUM (A TYPE)		320	X-3728-009-2	SCREW ASSY, FITTING (B TYPE)	
307	X-3941-027-1	RAIL (BASE) (3) ASSY (2), GUIDE (A TYPE)		321	3-728-108-01	SCREW (M1.4X4.5)	
308	3-743-633-01	SPRING, COMPRESSION (B TYPE)		322	3-728-231-06	BASE, TG-1 CAM	
309	A-7040-263-A	RAIL(S) BLOCK ASSY (3) (JD), GUIDE		323	3-732-064-01	COVER, ROTOR	
310	A-7049-461-A	DRUM ASSY, UPPER, ROTARY (DGR-80-R-(1)) MARKING: GREEN/RED, BLACK		324	3-728-126-01	SCREW (M1.4X2), SPECIAL HEAD	
310	A-7049-464-A	DRUM ASSY, UPPER, ROTARY (DGR-80-R-(2)) MARKING: RED, BLUE		325	* A-7040-203-C	BASE (A) BLOCK ASSY, DRUM	
311	3-727-809-01	BOLT (M1.4X5), HEXAGON SOCKET		326	3-728-108-41	SCREW (M1.4X2.7)	
312	3-727-807-01	BOLT (M1.7X3.3), HEXAGON SOCKET		327	3-943-088-01	WHEEL, FLY, IP	
313	3-703-816-51	SCREW (M1.4X3.5), SPECIAL HEAD (B TYPE)		M901	A-7048-534-A	DRUM BLOCK ASSY (DGH-80A-R)	
314	X-3727-906-1	ARM ASSY		M902	8-835-329-12	MOTOR, DC U-21A (CAPSTAN)	
				M903	1-541-607-21	MOTOR, DC (LA12G-344VA) (LOADING)	

5-7. MECHANICAL CHASSIS ASSEMBLY (2)



Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
351	3-728-065-01	SPRING, TENSION		363	X-3727-942-1	SLIDER ASSY, GL	
352	3-728-190-01	CAM (B)		364	3-727-929-01	SPRING (POWER TENSION), TENSION	
353	X-3727-930-1	GEAR ASSY, CONVERSION		365	3-728-144-01	ROLLER, GL	
354	X-3727-931-1	PULLEY ASSY, MIDWAY		366	3-331-007-11	WASHER	
355	3-728-154-01	ARM, EJ		367	3-728-212-01	BELT, RELAY	
356	3-941-980-01	ARM (T), LS		368	3-728-109-01	ROLLER, LS	
357	3-728-208-02	CAM (A)		369	3-728-148-11	SCREW (M1.4X2.5), SPECIAL HEAD	
358	3-728-213-01	SUPPORT (S), GL		370	3-315-384-31	WASHER, STOPPER	
359	X-3727-924-2	ARM ASSY, GUIDE LOCK		371	3-728-091-01	WASHER, STOPPER	
360	3-728-015-01	SPRING (POWER TENSION), TENSION		372	X-3940-335-1	ARM ASSY, PINCH PRESS	
361	3-728-228-03	SUPPORT (T), GL		373	A-7040-152-A	ARM BLOCK ASSY, PINCH PRESS	
362	A-7040-153-A	SLIDER BLOCK ASSY, GL		374	3-942-901-01	COVER (L), CAPSTAN	

5-8. ZOOM LENS ASSEMBLY



Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
401	1-547-494-11	LENS, ZOOM (VCL-7808XA)		408	3-708-297-01	MOTOR ASSY, PZ	
402	3-708-291-01	RING UNIT, F		409	3-708-298-01	METER ASSY, IG	
403	3-708-292-01	RUBBER, (F) RING		410	3-708-299-01	MOTOR ASSY, AF	
404	3-708-293-01	COVER, (F) ENCODER		411	3-708-300-01	RACK UNIT	
405	3-708-294-01	ENCODER UNIT, Z		412	3-708-301-01	ENCODER ASSY, Z	
406	3-708-295-01	SENSOR ASSY, RESET		413	3-708-302-01	SCREW, FITTING M.E	
407	3-708-296-01	ENCODER ASSY, F		414	3-708-303-01	SCREW, FITTING IG	

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SECTION 6 ELECTRICAL PARTS LIST

NOTE:

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- -XX, -X mean standardized parts, so they may have some differences from the original one.
- CAPACITORS
uF: μ F

- RESISTORS
All resistors are in ohms
METAL: Metal-film resistor
METAL OXIDE: Metal Oxide-film resistor
F: nonflammable
- COILS
uH: μ H
- SEMICONDUCTORS
In each case, u: μ , for example:
uA...: μ A..., uPA...: μ PA...,
uPB...: μ PB..., uPC...: μ PC...,
uPD...: μ PD...

The components identified by mark  or dotted line with mark  are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
	A-7062-906-A	AU-121 BOARD, COMPLETE ***** (Ref. No 6,000 Series)					
		< CAPACITOR >					
C801	1-135-091-00	TANTALUM CHIP 1uF	20% 16V	C831	1-135-091-00	TANTALUM CHIP 1uF	20% 16V
C802	1-162-957-11	CERAMIC CHIP 220PF	5% 50V	C832	1-162-957-11	CERAMIC CHIP 220PF	5% 50V
C803	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V	C833	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C805	1-135-181-21	TANTALUM CHIP 4.7uF	20% 6.3V	C834	1-135-181-21	TANTALUM CHIP 4.7uF	20% 6.3V
C806	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V	C835	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V
				C836	1-126-209-11	ELECT CHIP 100uF	20% 4V
C807	1-124-778-00	ELECT CHIP 22uF	20% 6.3V	C837	1-124-778-00	ELECT CHIP 22uF	20% 6.3V
C808	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V	C838	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V
C809	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V	C839	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C810	1-126-607-11	ELECT CHIP 47uF	20% 4V	C840	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C811	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V	C841	1-126-607-11	ELECT CHIP 47uF	20% 4V
				C842	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C812	1-163-989-11	CERAMIC CHIP 0.033uF	10% 25V	C843	1-163-989-11	CERAMIC CHIP 0.033uF	10% 25V
C813	1-162-967-11	CERAMIC CHIP 0.0033uF	10% 50V	C844	1-162-967-11	CERAMIC CHIP 0.0033uF	10% 50V
C814	1-163-809-11	CERAMIC CHIP 0.047uF	10% 25V	C845	1-163-809-11	CERAMIC CHIP 0.047uF	10% 25V
C815	1-162-965-11	CERAMIC CHIP 0.0015uF	10% 50V	C846	1-162-965-11	CERAMIC CHIP 0.0015uF	10% 50V
C816	1-162-949-11	CERAMIC CHIP 47PF	5% 50V				
				C847	1-162-949-11	CERAMIC CHIP 47PF	5% 50V
C817	1-162-957-11	CERAMIC CHIP 220PF	5% 50V	C848	1-162-957-11	CERAMIC CHIP 220PF	5% 50V
C818	1-135-181-21	TANTALUM CHIP 4.7uF	20% 6.3V	C849	1-135-181-21	TANTALUM CHIP 4.7uF	20% 6.3V
C819	1-135-091-00	TANTALUM CHIP 1uF	20% 16V	C850	1-135-091-00	TANTALUM CHIP 1uF	20% 16V
C820	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V	C851	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V
C821	1-162-966-11	CERAMIC CHIP 0.0022uF	10% 50V				
				C852	1-162-966-11	CERAMIC CHIP 0.0022uF	10% 50V
C822	1-126-205-11	ELECT CHIP 47uF	20% 6.3V	C853	1-126-205-11	ELECT CHIP 47uF	20% 6.3V
C823	1-126-205-11	ELECT CHIP 47uF	20% 6.3V	C854	1-126-205-11	ELECT CHIP 47uF	20% 6.3V
C824	1-135-091-00	TANTALUM CHIP 1uF	20% 16V	C855	1-135-091-00	TANTALUM CHIP 1uF	20% 16V
C825	1-162-977-11	CERAMIC CHIP 0.0018uF	10% 50V	C856	1-162-977-11	CERAMIC CHIP 0.0018uF	10% 50V
C826	1-162-969-11	CERAMIC CHIP 0.0068uF	10% 25V				
				C857	1-162-969-11	CERAMIC CHIP 0.0068uF	10% 25V
C827	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V	C858	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C828	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V	C859	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C829	1-162-968-11	CERAMIC CHIP 0.0047uF	10% 50V	C860	1-162-952-11	CERAMIC CHIP 82PF	5% 50V
C830	1-162-968-11	CERAMIC CHIP 0.0047uF	10% 50V	C861	1-135-091-00	TANTALUM CHIP 1uF	20% 16V
				C862	1-128-003-11	ELECT CHIP 22uF	20% 4V
				C863	1-135-091-00	TANTALUM CHIP 1uF	20% 16V
				C864	1-135-091-00	TANTALUM CHIP 1uF	20% 16V

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
C865	1-128-003-11	ELECT CHIP	22uF 20% 4V			< TRANSISTOR >	
C866	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V	Q801	8-729-905-23	TRANSISTOR 2SA1576-R	
C867	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	Q802	8-729-905-18	TRANSISTOR DTC144EU	
C868	1-126-607-11	ELECT CHIP	47uF 20% 4V	Q803	8-729-402-81	TRANSISTOR XN4501	
C869	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	Q804	8-729-402-81	TRANSISTOR XN4501	
C870	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	Q805	8-729-402-81	TRANSISTOR XN4501	
C871	1-126-607-11	ELECT CHIP	47uF 20% 4V			< RESISTOR >	
C872	1-135-091-00	TANTALUM CHIP	1uF 20% 16V	R801	1-216-836-11	METAL CHIP 18K 5% 1/16W	
C873	1-128-003-11	ELECT CHIP	22uF 20% 4V	R802	1-216-840-11	METAL CHIP 39K 5% 1/16W	
C874	1-135-091-00	TANTALUM CHIP	1uF 20% 16V	R804	1-216-837-11	METAL CHIP 22K 5% 1/16W	
C875	1-135-091-00	TANTALUM CHIP	1uF 20% 16V	R805	1-216-859-11	METAL GLAZE 1.5M 5% 1/16W	
C876	1-128-003-11	ELECT CHIP	22uF 20% 4V	R806	1-216-836-11	METAL CHIP 18K 5% 1/16W	
C877	1-164-005-11	CERAMIC CHIP	0.47uF 25V	R808	1-216-836-11	METAL CHIP 18K 5% 1/16W	
C878	1-162-957-11	CERAMIC CHIP	220PF 5% 50V	R810	1-216-832-11	METAL CHIP 8.2K 5% 1/16W	
C879	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V	R811	1-216-839-11	METAL CHIP 33K 5% 1/16W	
C880	1-162-957-11	CERAMIC CHIP	220PF 5% 50V	R812	1-216-833-11	METAL CHIP 10K 5% 1/16W	
C881	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	R813	1-216-810-11	METAL CHIP 120 5% 1/16W	
C882	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	R814	1-216-821-11	METAL CHIP 1K 5% 1/16W	
C883	1-164-360-11	CERAMIC CHIP	0.1uF 16V	R815	1-216-833-11	METAL CHIP 10K 5% 1/16W	
C885	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	R816	1-216-845-11	METAL CHIP 100K 5% 1/16W	
C886	1-135-181-21	TANTALUM CHIP	4.7uF 20% 6.3V	R817	1-216-821-11	METAL CHIP 1K 5% 1/16W	
C887	1-135-181-21	TANTALUM CHIP	4.7uF 20% 6.3V	R818	1-216-848-11	METAL CHIP 180K 5% 1/16W	
C888	1-126-205-11	ELECT CHIP	47uF 20% 6.3V	R831	1-216-836-11	METAL CHIP 18K 5% 1/16W	
C889	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	R832	1-216-840-11	METAL CHIP 39K 5% 1/16W	
C890	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	R833	1-216-835-11	METAL CHIP 15K 5% 1/16W	
C891	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	R835	1-216-837-11	METAL CHIP 22K 5% 1/16W	
C892	1-164-360-11	CERAMIC CHIP	0.1uF 16V	R836	1-216-859-11	METAL GLAZE 1.5M 5% 1/16W	
C893	1-162-969-11	CERAMIC CHIP	0.0068uF 10% 25V	R837	1-216-836-11	METAL CHIP 18K 5% 1/16W	
C894	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	R839	1-216-836-11	METAL CHIP 18K 5% 1/16W	
C895	1-164-360-11	CERAMIC CHIP	0.1uF 16V	R841	1-216-832-11	METAL CHIP 8.2K 5% 1/16W	
C896	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	R842	1-216-825-11	METAL CHIP 2.2K 5% 1/16W	
C897	1-164-360-11	CERAMIC CHIP	0.1uF 16V	R843	1-216-839-11	METAL CHIP 33K 5% 1/16W	
C898	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	R844	1-216-833-11	METAL CHIP 10K 5% 1/16W	
C899	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	R845	1-216-810-11	METAL CHIP 120 5% 1/16W	
		< CONNECTOR >		R846	1-216-821-11	METAL CHIP 1K 5% 1/16W	
CN801	1-580-249-61	CONNECTOR, BOARD TO BOARD 24P		R847	1-216-833-11	METAL CHIP 10K 5% 1/16W	
CN802	1-580-789-21	PIN, CONNECTOR (SMD) 6P		R848	1-216-845-11	METAL CHIP 100K 5% 1/16W	
CN803	* 1-566-758-11	PIN, CONNECTOR (PC BOARD) 3P		R849	1-216-821-11	METAL CHIP 1K 5% 1/16W	
		< FILTER >		R850	1-216-817-11	METAL CHIP 470 5% 1/16W	
FL801	1-236-837-21	FILTER, BAND PASS		R852	1-216-801-11	METAL CHIP 22 5% 1/16W	
FL802	1-236-838-21	FILTER, BAND PASS		R861	1-216-864-11	METAL CHIP 0 5% 1/16W	
		< IC >		R862	1-216-830-11	METAL CHIP 5.6K 5% 1/16W	
IC801	8-759-823-19	IC CXA1488R		R863	1-216-864-11	METAL CHIP 0 5% 1/16W	
IC802	8-759-823-19	IC CXA1488R		R864	1-216-830-11	METAL CHIP 5.6K 5% 1/16W	
IC803	8-759-823-21	IC CXA1536Q		R866	1-216-841-11	METAL CHIP 47K 5% 1/16W	
IC804	8-759-008-67	IC MC14066BF		R867	1-216-841-11	METAL CHIP 47K 5% 1/16W	
				R870	1-216-845-11	METAL CHIP 100K 5% 1/16W	

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BATTERY TERMINAL

CD-74

Ref. No.	Part No.	Description	Remark
R871	1-216-675-11	METAL CHIP 10K 0.5% 1/10W	
R872	1-216-667-11	METAL CHIP 4.7K 0.5% 1/10W	
R873	1-216-671-11	METAL CHIP 6.8K 0.5% 1/10W	
R874	1-216-837-11	METAL CHIP 22K 5% 1/16W	
R875	1-216-836-11	METAL CHIP 18K 5% 1/16W	
R876	1-216-819-11	METAL CHIP 680 5% 1/16W	
R877	1-216-821-11	METAL CHIP 1K 5% 1/16W	
R878	1-216-827-11	METAL CHIP 3.3K 5% 1/16W	
R879	1-216-827-11	METAL CHIP 3.3K 5% 1/16W	
R880	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R881	1-216-827-11	METAL CHIP 3.3K 5% 1/16W	
R882	1-216-825-11	METAL CHIP 2.2K 5% 1/16W	
R883	1-216-825-11	METAL CHIP 2.2K 5% 1/16W	
R884	1-216-837-11	METAL CHIP 22K 5% 1/16W	
R885	1-216-836-11	METAL CHIP 18K 5% 1/16W	
R886	1-216-827-11	METAL CHIP 3.3K 5% 1/16W	
R887	1-216-827-11	METAL CHIP 3.3K 5% 1/16W	
R888	1-216-825-11	METAL CHIP 2.2K 5% 1/16W	
R889	1-216-837-11	METAL CHIP 22K 5% 1/16W	
R890	1-216-836-11	METAL CHIP 18K 5% 1/16W	
R891	1-216-821-11	METAL CHIP 1K 5% 1/16W	
R892	1-216-821-11	METAL CHIP 1K 5% 1/16W	
R893	1-216-817-11	METAL CHIP 470 5% 1/16W	
R894	1-216-813-11	METAL CHIP 220 5% 1/16W	
R895	1-216-819-11	METAL CHIP 680 5% 1/16W	
R896	1-216-821-11	METAL CHIP 1K 5% 1/16W	
R897	1-216-821-11	METAL CHIP 1K 5% 1/16W	
R898	1-216-821-11	METAL CHIP 1K 5% 1/16W	
R899	1-216-821-11	METAL CHIP 1K 5% 1/16W	

< VARIABLE RESISTOR >

RV801	1-238-092-11	RES. ADJ. CERMET 47K
RV802	1-238-092-11	RES. ADJ. CERMET 47K
RV803	1-238-092-11	RES. ADJ. CERMET 47K
RV804	1-238-092-11	RES. ADJ. CERMET 47K
RV805	1-238-090-11	RES. ADJ. CERMET 10K

RV806	1-238-090-11	RES. ADJ. CERMET 10K
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1-537-297-31 BATTERY TERMINAL BOARD

< IC LINK >

PS901	△ 1-532-841-21	LINK, IC PRF1600 (1.6A)
PS902	△ 1-532-841-21	LINK, IC PRF1600 (1.6A)
PS903	△ 1-532-841-21	LINK, IC PRF1600 (1.6A)

Note 1

For replacement of CCD imager, CD-74 board, complete and DT-77 board, complete read carefully the CAUTIONS FOR REPLACEMENT OF CCD IMAGER on page 88.

Ref. No.	Part No.	Description	Remark
	A-7071-475-A	CD-74 BOARD, COMPLETE (Note.1)	

		(Ref. No 2, 000 Series)	
		< CAPACITOR >	
C902	1-135-162-21	TANTALUM CHIP 33uF 20% 6.3V	
C905	1-162-970-11	CERAMIC CHIP 0.01uF 10% 25V	
C907	1-135-091-00	TANTALUM CHIP 1uF 20% 16V	
C908	1-135-159-21	TANTALUM CHIP 10uF 10% 20V	
C909	1-162-637-11	CERAMIC CHIP 0.47uF 16V	
C910	1-164-156-11	CERAMIC CHIP 0.1uF 25V	
C911	1-135-079-21	TANTALUM CHIP 3.3uF 10% 35V	
C912	1-135-076-21	TANTALUM CHIP 1uF 10% 35V	
		< CONNECTOR >	
CN901	1-580-266-61	CONNECTOR, BOARD TO BOARD 18P	
		< DIODE >	
D901	8-719-820-05	DIODE 1SS181	
D902	8-719-404-46	DIODE MA110	
D903	8-719-404-46	DIODE MA110	
D904	8-719-800-76	DIODE 1SS226	
		< IC >	
IC901	8-752-606-77	IC ICX0398NA-2 (CCD IMAGER) (Note.1)	
		< COIL >	
L901	1-412-032-11	INDUCTOR CHIP 100uH	
		< TRANSISTOR >	
Q901	8-729-232-86	TRANSISTOR 2SK1875-BL/V-TE85L	
Q902	8-729-905-35	TRANSISTOR 2SC4081-R	
Q903	8-729-402-19	TRANSISTOR XN6501	
		< RESISTOR >	
R901	1-216-820-11	METAL CHIP 820 5% 1/16W	
R902	1-216-840-11	METAL CHIP 39K 5% 1/16W	
R903	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R904	1-216-828-11	METAL CHIP 3.9K 5% 1/16W	
R905	1-216-809-11	METAL CHIP 100 5% 1/16W	
R906	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R907	1-216-857-11	METAL CHIP 1M 5% 1/16W	
R908	1-216-843-11	METAL CHIP 68K 5% 1/16W	
R909	1-216-835-11	METAL CHIP 15K 5% 1/16W	
R910	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R911	1-216-850-11	METAL CHIP 270K 5% 1/16W	
R912	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R913	1-216-864-11	METAL CHIP 0 5% 1/16W	

Note: The components identified by mark △ or dotted line with mark △ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description	Remark		
▲	A-7062-903-A	DD-33P BOARD, COMPLETE			

(Ref. No 3, 000 Series)					
* 3-942-935-01 CASE (LID), SHIELD, DD CONVERTER					
* 3-942-982-01 CASE (MAIN), SHIELD, DD CONVERTER					
< CAPACITOR >					
C101	1-128-078-11	ELECT	33uF	20%	10V
C102	1-163-119-00	CERAMIC CHIP	120PF	5%	50V
C103	1-164-633-11	CERAMIC CHIP	0.1uF	10%	25V
C104	1-164-633-11	CERAMIC CHIP	0.1uF	10%	25V
C105	1-164-633-11	CERAMIC CHIP	0.1uF	10%	25V
C106	1-128-078-11	ELECT	33uF	20%	10V
C201	1-128-078-11	ELECT	33uF	20%	10V
C202	1-163-005-11	CERAMIC CHIP	470PF	10%	50V
C203	1-128-078-11	ELECT	33uF	20%	10V
C204	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C205	1-127-558-11	ELECT (SOLID)	10uF	20%	10V
C206	1-164-633-11	CERAMIC CHIP	0.1uF	10%	25V
C207	1-164-633-11	CERAMIC CHIP	0.1uF	10%	25V
C208	1-164-005-11	CERAMIC CHIP	0.47uF		25V
C209	1-164-005-11	CERAMIC CHIP	0.47uF		25V
C210	1-164-830-11	CERAMIC CHIP	1uF	22%	16V
C211	1-164-337-11	CERAMIC CHIP	2.2uF		16V
C212	1-162-974-11	CERAMIC CHIP	0.01uF		50V
C301	1-124-584-00	ELECT	100uF	20%	10V
C302	1-164-161-11	CERAMIC CHIP	0.0022uF	10%	100V
C303	1-164-633-11	CERAMIC CHIP	0.1uF	10%	25V
C304	1-164-633-11	CERAMIC CHIP	0.1uF	10%	25V
C305	1-162-963-11	CERAMIC CHIP	680PF	10%	50V
C306	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C307	1-128-078-11	ELECT	33uF	20%	10V
C308	1-164-830-11	CERAMIC CHIP	1uF	22%	16V
C309	1-127-558-11	ELECT (SOLID)	10uF	20%	10V
C310	1-164-337-11	CERAMIC CHIP	2.2uF		16V
C311	1-164-337-11	CERAMIC CHIP	2.2uF		16V
C312	1-164-830-11	CERAMIC CHIP	1uF	22%	16V
C313	1-164-830-11	CERAMIC CHIP	1uF	22%	16V
C314	1-164-337-11	CERAMIC CHIP	2.2uF		16V
C316	1-164-337-11	CERAMIC CHIP	2.2uF		16V
C317	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C318	1-164-337-11	CERAMIC CHIP	2.2uF		16V
C401	1-162-962-11	CERAMIC CHIP	470PF	10%	50V
C402	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C403	1-127-558-11	ELECT (SOLID)	10uF	20%	10V
C404	1-164-005-11	CERAMIC CHIP	0.47uF		25V
C405	1-164-005-11	CERAMIC CHIP	0.47uF		25V
C406	1-164-005-11	CERAMIC CHIP	0.47uF		25V

Ref. No.	Part No.	Description	Remark		
C501	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C502	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C503	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C504	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C505	1-127-558-11	ELECT (SOLID)	10uF	20%	10V
C506	1-127-558-11	ELECT (SOLID)	10uF	20%	10V
C507	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
< CONNECTOR >					
CN101	* 1-566-184-11	PIN, CONNECTOR (PC BOARD)	5P		
< DIODE >					
D202	8-719-941-23	DIODE	DA204U		
D301	8-719-989-33	DIODE	FC806		
D401	8-719-941-04	DIODE	SB007-03CP		
D501	8-719-938-75	DIODE	SB05-05CP		
D502	8-719-938-75	DIODE	SB05-05CP		
< IC >					
IC101	8-759-035-98	IC	MC141600FU		
IC102	8-759-035-98	IC	MC141600FU		
IC202	8-759-209-57	IC	TC4S69F		
< COIL >					
L101	1-424-519-21	COIL, MOLD CHOKE	1.0uH		
L102	1-424-519-21	COIL, MOLD CHOKE	1.0uH		
L103	1-424-520-21	COIL, MOLD CHOKE	4.7uH		
L201	1-424-519-21	COIL, MOLD CHOKE	1.0uH		
L202	1-424-520-21	COIL, MOLD CHOKE	4.7uH		
L203	1-424-523-21	COIL, CHOKE	22uH		
L204	1-424-522-21	COIL, CHOKE	10uH		
L205	1-412-030-11	INDUCTOR CHIP	22uH		
L206	1-412-030-11	INDUCTOR CHIP	22uH		
L301	1-424-519-21	COIL, MOLD CHOKE	1.0uH		
L302	1-424-520-21	COIL, MOLD CHOKE	4.7uH		
L303	1-424-523-21	COIL, CHOKE	22uH		
L304	1-412-034-21	INDUCTOR CHIP	330uH		
L305	1-412-032-11	INDUCTOR CHIP	100uH		
L306	1-412-028-11	INDUCTOR CHIP	4.7uH		
L401	1-424-524-21	COIL, CHOKE	47uH		
L402	1-412-030-11	INDUCTOR CHIP	22uH		
L403	1-412-030-11	INDUCTOR CHIP	22uH		
L501	1-424-524-21	COIL, CHOKE	47uH		
L502	1-424-524-21	COIL, CHOKE	47uH		
< TRANSISTOR >					
Q101	8-729-823-93	TRANSISTOR	FC150		
Q102	8-729-823-95	TRANSISTOR	FC149		
Q201	8-729-823-84	TRANSISTOR	FP102		

Note: The components identified by mark ▲ or dotted line with mark ▲ are critical for safety. Replace only with part number specified.

DD-33P

FP-423

Ref.No.	Part No.	Description	Remark
Q301	8-729-804-41	TRANSISTOR 2SB1122-S	
Q302	8-729-823-84	TRANSISTOR FP102	
Q303	8-729-901-06	TRANSISTOR DTA144EK	
Q401	8-729-012-63	TRANSISTOR 2SB1396-S/T/U	
Q501	8-729-805-25	TRANSISTOR 2SB1121	
Q502	8-729-805-25	TRANSISTOR 2SB1121	
< RESISTOR >			
R101	1-216-844-11	METAL CHIP 82K 5% 1/16W	
R102	1-216-835-11	METAL CHIP 15K 5% 1/16W	
R103	1-216-839-11	METAL CHIP 33K 5% 1/16W	
R104	1-216-836-11	METAL CHIP 18K 5% 1/16W	
R105	1-216-829-11	METAL CHIP 4.7K 5% 1/16W	
R106	1-216-840-11	METAL CHIP 39K 5% 1/16W	
R107	1-216-117-00	METAL CHIP 680K 5% 1/10W	
R201	1-216-687-11	METAL CHIP 33K 0.5% 1/10W	
R202	1-216-837-11	METAL CHIP 22K 5% 1/16W	
R203	1-216-685-11	METAL CHIP 27K 0.5% 1/10W	
R204	1-216-689-11	METAL CHIP 39K 0.5% 1/10W	
R205	1-216-089-00	METAL CHIP 47K 5% 1/10W	
R206	1-216-838-11	METAL CHIP 27K 5% 1/16W	
R207	1-216-033-00	METAL CHIP 220 5% 1/10W	
R210	1-216-834-11	METAL CHIP 12K 5% 1/16W	
R211	1-216-853-11	METAL CHIP 470K 5% 1/16W	
R301	1-216-097-00	METAL CHIP 100K 5% 1/10W	
R302	1-216-097-00	METAL CHIP 100K 5% 1/10W	
R303	1-216-850-11	METAL CHIP 270K 5% 1/16W	
R305	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R306	1-216-699-11	METAL CHIP 100K 0.5% 1/10W	
R307	1-216-111-00	METAL CHIP 390K 5% 1/10W	
R308	1-216-107-00	METAL CHIP 270K 5% 1/10W	
R309	1-216-839-11	METAL CHIP 33K 5% 1/16W	
R310	1-216-085-00	METAL CHIP 33K 5% 1/10W	
R311	1-216-085-00	METAL CHIP 33K 5% 1/10W	
R312	1-216-685-11	METAL CHIP 27K 0.5% 1/10W	
R313	1-216-689-11	METAL CHIP 39K 0.5% 1/10W	
R314	1-216-824-11	METAL CHIP 1.8K 5% 1/16W	
R315	1-216-687-11	METAL CHIP 33K 0.5% 1/10W	
R316	1-216-097-00	METAL CHIP 100K 5% 1/10W	
R317	1-216-033-00	METAL CHIP 220 5% 1/10W	
R318	1-216-033-00	METAL CHIP 220 5% 1/10W	
R319	1-216-005-00	METAL CHIP 15 5% 1/10W	
R320	1-216-089-00	METAL CHIP 47K 5% 1/10W	
R321	1-216-061-00	METAL CHIP 3.3K 5% 1/10W	
R323	1-216-049-00	METAL CHIP 1K 5% 1/10W	
R324	1-216-679-11	METAL CHIP 15K 0.5% 1/10W	
R325	1-216-049-00	METAL CHIP 1K 5% 1/10W	
R401	1-216-687-11	METAL CHIP 33K 0.5% 1/10W	

Ref.No.	Part No.	Description	Remark
R402	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R403	1-216-685-11	METAL CHIP 27K 0.5% 1/10W	
R404	1-216-689-11	METAL CHIP 39K 0.5% 1/10W	
R405	1-216-841-11	METAL CHIP 47K 5% 1/16W	
R406	1-216-838-11	METAL CHIP 27K 5% 1/16W	
R407	1-216-033-00	METAL CHIP 220 5% 1/10W	
R408	1-216-055-00	METAL CHIP 1.8K 5% 1/10W	
R501	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R502	1-216-837-11	METAL CHIP 22K 5% 1/16W	
R503	1-216-841-11	METAL CHIP 47K 5% 1/16W	
R504	1-216-841-11	METAL CHIP 47K 5% 1/16W	
R505	1-216-089-00	METAL CHIP 47K 5% 1/10W	
R506	1-216-089-00	METAL CHIP 47K 5% 1/10W	
R507	1-216-839-11	METAL CHIP 33K 5% 1/16W	
R508	1-216-839-11	METAL CHIP 33K 5% 1/16W	
R509	1-216-033-00	METAL CHIP 220 5% 1/10W	
R510	1-216-033-00	METAL CHIP 220 5% 1/10W	
R511	1-216-097-00	METAL CHIP 100K 5% 1/10W	

< VARIABLE RESISTOR >

RV101	1-238-092-11	RES. ADJ. CERMET 47K
RV102	1-238-091-11	RES. ADJ. CERMET 22K

< TRANSFORMER >

T301	1-450-524-11	TRANSFORMER, CONVERTER
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A-7062-792-A FP-423 BOARD, COMPLETE

(Ref. No 8,000 Series)

3-727-954-01	HOLDER (T), SENSOR
3-727-957-01	HOLDER (S), SENSOR
3-732-046-01	HOLDER, LED

< DIODE >

D991	8-719-951-03	DIODE GL-453
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< HALL ELEMENT >

H991	1-808-448-11	ELEMENT, HALL (CHIP TYPE)
H992	1-808-448-11	ELEMENT, HALL (CHIP TYPE)

< TRANSISTOR >

Q991	8-729-907-25	TRANSISTOR PT4850F
Q992	8-729-907-25	TRANSISTOR PT4850F

< RESISTOR >

R991	1-216-817-11	METAL CHIP 470 5% 1/16W
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Ref. No.	Part No.	Description	Remark
R992	1-216-817-11	METAL CHIP 470 5% 1/16W	
R993	1-216-817-11	METAL CHIP 470 5% 1/16W	
R994	1-216-817-11	METAL CHIP 470 5% 1/16W	

< SWITCH >

S991	1-572-611-11	SWITCH, LEAF (CLOCK)	
S992	1-572-802-12	SWITCH, PUSH (3 KEY) (TAPE SELECT)	

A-7071-474-A HL-4 BOARD, COMPLETE

 (Ref. No 6,000 Series)

< CAPACITOR >

C501	1-162-964-11	CERAMIC CHIP 0.001uF 10% 50V	
C503	1-162-964-11	CERAMIC CHIP 0.001uF 10% 50V	
C505	1-162-964-11	CERAMIC CHIP 0.001uF 10% 50V	
C506	1-162-964-11	CERAMIC CHIP 0.001uF 10% 50V	

< CONNECTOR >

CN501	1-566-760-11	PIN, CONNECTOR (PC BOARD) 5P	
CN502	* 1-565-541-11	PIN, CONNECTOR (PC BOARD) 2P	
CN503	* 1-566-762-11	PIN, CONNECTOR (PC BOARD) 7P	

< DIODE >

D501	8-719-420-14	DIODE MA8082-M	
D502	8-719-106-71	DIODE RD12M-B2	
D503	8-719-420-14	DIODE MA8082-M	
D504	8-719-420-14	DIODE MA8082-M	
D505	8-719-420-14	DIODE MA8082-M	
D506	8-719-420-14	DIODE MA8082-M	
D507	8-719-941-86	DIODE DAN202U	

< JACK >

J501	1-565-276-21	JACK, ULTRA SMALL 1P (REMOTE)	
J502	1-569-809-11	JACK (SMALL TYPE) (PHONES)	

< RESISTOR >

R501	1-216-296-00	METAL CHIP 0 5% 1/8W	
R502	1-216-296-00	METAL CHIP 0 5% 1/8W	
R503	1-216-296-00	METAL CHIP 0 5% 1/8W	
R504	1-216-296-00	METAL CHIP 0 5% 1/8W	
R505	1-216-296-00	METAL CHIP 0 5% 1/8W	
R506	1-216-296-00	METAL CHIP 0 5% 1/8W	

Ref. No.	Part No.	Description	Remark
	A-7062-902-A	LD-51 BOARD, COMPLETE	

		(Ref. No 2,000 Series)	

< CAPACITOR >

C851	1-162-974-11	CERAMIC CHIP 0.01uF 50V	
C852	1-162-974-11	CERAMIC CHIP 0.01uF 50V	
C853	1-162-974-11	CERAMIC CHIP 0.01uF 50V	
C854	1-135-091-00	TANTALUM CHIP 1uF 20% 16V	
C855	1-135-091-00	TANTALUM CHIP 1uF 20% 16V	
C856	1-135-181-21	TANTALUM CHIP 4.7uF 20% 6.3V	
C857	1-162-964-11	CERAMIC CHIP 0.001uF 10% 50V	
C858	1-162-964-11	CERAMIC CHIP 0.001uF 10% 50V	
C860	1-164-360-11	CERAMIC CHIP 0.1uF 16V	
C861	1-162-968-11	CERAMIC CHIP 0.0047uF 10% 50V	
C862	1-162-974-11	CERAMIC CHIP 0.01uF 50V	
C863	1-162-974-11	CERAMIC CHIP 0.01uF 50V	
C864	1-164-633-11	CERAMIC CHIP 0.1uF 10% 25V	
C865	1-135-091-00	TANTALUM CHIP 1uF 20% 16V	
C866	1-164-315-11	CERAMIC CHIP 470PF 10% 50V	
C868	1-164-360-11	CERAMIC CHIP 0.1uF 16V	
C885	1-162-974-11	CERAMIC CHIP 0.01uF 50V	
C886	1-162-638-11	CERAMIC CHIP 1uF 16V	
C891	1-135-181-21	TANTALUM CHIP 4.7uF 20% 6.3V	
C894	1-164-360-11	CERAMIC CHIP 0.1uF 16V	

C895	1-162-974-11	CERAMIC CHIP 0.01uF 50V	
C896	1-162-974-11	CERAMIC CHIP 0.01uF 50V	
C897	1-162-974-11	CERAMIC CHIP 0.01uF 50V	

< CONNECTOR >

CN851	* 1-565-875-11	PIN, CONNECTOR (PC BOARD) 3P	
CN852	1-573-563-61	CONNECTOR, BOARD TO BOARD 3P	
CN853	1-565-874-11	PIN, CONNECTOR (PC BOARD) 2P	
CN854	1-566-540-11	CONNECTOR, FPC (NON ZIF) 8P	
CN855	* 1-565-875-11	PIN, CONNECTOR (PC BOARD) 3P	
CN856	1-566-537-11	CONNECTOR, FPC (NON ZIF) 5P	
CN857	1-580-057-11	PIN, CONNECTOR 4P	

< IC >

IC851	8-759-998-96	IC LM324D	
IC852	8-759-998-96	IC LM324D	
IC853	8-759-513-26	IC XRU5846FS	
IC854	8-759-981-82	IC RC3414M	
IC881	8-759-823-51	IC LB1830M	
IC891	8-759-038-81	IC MPC1724M	

< COIL >

L891	1-410-381-11	INDUCTOR CHIP 10uH	
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LD-51

MA-116

Ref. No.	Part No.	Description	Remark
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< TRANSISTOR >

Q851	8-729-905-35	TRANSISTOR	2SC4081-R
Q852	8-729-403-35	TRANSISTOR	UN5113
Q885	8-729-925-42	TRANSISTOR	1MT2
Q891	8-729-905-61	TRANSISTOR	DTC124EU

< RESISTOR >

R851	1-216-833-11	METAL CHIP	10K 5% 1/16W
R852	1-216-833-11	METAL CHIP	10K 5% 1/16W
R853	1-216-835-11	METAL CHIP	15K 5% 1/16W
R854	1-216-835-11	METAL CHIP	15K 5% 1/16W
R855	1-216-821-11	METAL CHIP	1K 5% 1/16W
R856	1-216-848-11	METAL CHIP	180K 5% 1/16W
R857	1-216-833-11	METAL CHIP	10K 5% 1/16W
R858	1-216-855-11	METAL CHIP	680K 5% 1/16W
R859	1-216-851-11	METAL CHIP	330K 5% 1/16W
R860	1-216-848-11	METAL CHIP	180K 5% 1/16W
R861	1-216-841-11	METAL CHIP	47K 5% 1/16W
R862	1-216-824-11	METAL CHIP	1.8K 5% 1/16W
R863	1-216-833-11	METAL CHIP	10K 5% 1/16W
R864	1-216-857-11	METAL CHIP	1M 5% 1/16W
R865	1-216-820-11	METAL CHIP	820 5% 1/16W
R866	1-216-827-11	METAL CHIP	3.3K 5% 1/16W
R867	1-216-837-11	METAL CHIP	22K 5% 1/16W
R868	1-216-844-11	METAL CHIP	82K 5% 1/16W
R869	1-216-843-11	METAL CHIP	68K 5% 1/16W
R870	1-216-841-11	METAL CHIP	47K 5% 1/16W
R871	1-216-839-11	METAL CHIP	33K 5% 1/16W
R872	1-216-833-11	METAL CHIP	10K 5% 1/16W
R873	1-216-833-11	METAL CHIP	10K 5% 1/16W
R874	1-216-857-11	METAL CHIP	1M 5% 1/16W
R875	1-216-819-11	METAL CHIP	680 5% 1/16W
R876	1-216-837-11	METAL CHIP	22K 5% 1/16W
R877	1-216-839-11	METAL CHIP	33K 5% 1/16W
R878	1-216-839-11	METAL CHIP	33K 5% 1/16W
R879	1-216-841-11	METAL CHIP	47K 5% 1/16W
R880	1-216-841-11	METAL CHIP	47K 5% 1/16W
R881	1-216-031-00	METAL CHIP	180 5% 1/10W
R883	1-216-839-11	METAL CHIP	33K 5% 1/16W
R884	1-216-839-11	METAL CHIP	33K 5% 1/16W
R885	1-216-134-00	METAL CHIP	2.2 5% 1/8W
R886	1-216-829-11	METAL CHIP	4.7K 5% 1/16W
R887	1-216-845-11	METAL CHIP	100K 5% 1/16W
R888	1-216-845-11	METAL CHIP	100K 5% 1/16W
R891	1-216-842-11	METAL CHIP	56K 5% 1/16W
R892	1-216-816-11	METAL CHIP	390 5% 1/16W

Ref. No.	Part No.	Description	Remark
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A-7062-907-A MA-116 BOARD, COMPLETE

(Ref. No 6,000 Series)

< CAPACITOR >

C901	1-163-989-11	CERAMIC CHIP	0.033uF 10% 25V
C902	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C903	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C904	1-162-953-11	CERAMIC CHIP	100PF 5% 50V
C905	1-163-809-11	CERAMIC CHIP	0.047uF 10% 25V
C906	1-164-633-11	CERAMIC CHIP	0.1uF 10% 25V
C907	1-163-989-11	CERAMIC CHIP	0.033uF 10% 25V
C908	1-163-989-11	CERAMIC CHIP	0.033uF 10% 25V
C909	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C910	1-164-633-11	CERAMIC CHIP	0.1uF 10% 25V
C911	1-135-091-00	TANTALUM CHIP	1uF 20% 16V
C912	1-164-245-11	CERAMIC CHIP	0.015uF 10% 25V
C913	1-163-037-11	CERAMIC CHIP	0.022uF 10% 25V
C914	1-163-037-11	CERAMIC CHIP	0.022uF 10% 25V
C915	1-162-962-11	CERAMIC CHIP	470PF 10% 50V
C916	1-162-957-11	CERAMIC CHIP	220PF 5% 50V
C917	1-162-953-11	CERAMIC CHIP	100PF 5% 50V
C918	1-162-953-11	CERAMIC CHIP	100PF 5% 50V
C951	1-163-989-11	CERAMIC CHIP	0.033uF 10% 25V
C952	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C953	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C954	1-162-953-11	CERAMIC CHIP	100PF 5% 50V
C955	1-163-809-11	CERAMIC CHIP	0.047uF 10% 25V
C956	1-164-633-11	CERAMIC CHIP	0.1uF 10% 25V
C957	1-163-989-11	CERAMIC CHIP	0.033uF 10% 25V
C958	1-163-989-11	CERAMIC CHIP	0.033uF 10% 25V
C959	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C960	1-164-633-11	CERAMIC CHIP	0.1uF 10% 25V
C961	1-135-091-00	TANTALUM CHIP	1uF 20% 16V
C962	1-164-245-11	CERAMIC CHIP	0.015uF 10% 25V
C963	1-163-037-11	CERAMIC CHIP	0.022uF 10% 25V
C964	1-163-037-11	CERAMIC CHIP	0.022uF 10% 25V
C965	1-162-962-11	CERAMIC CHIP	470PF 10% 50V
C966	1-162-957-11	CERAMIC CHIP	220PF 5% 50V
C967	1-162-953-11	CERAMIC CHIP	100PF 5% 50V
C968	1-162-953-11	CERAMIC CHIP	100PF 5% 50V
C991	1-126-205-11	ELECT CHIP	47uF 20% 6.3V
C992	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C993	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C994	1-162-957-11	CERAMIC CHIP	220PF 5% 50V
C995	1-162-957-11	CERAMIC CHIP	220PF 5% 50V

Ref. No.	Part No.	Description	Remark
< CONNECTOR >			
CN901	* 1-566-759-11	PIN, CONNECTOR (PC BOARD) 4P	
CN902	* 1-566-759-11	PIN, CONNECTOR (PC BOARD) 4P	
CN903	* 1-566-761-11	PIN, CONNECTOR (PC BOARD) 6P	
< DIODE >			
D901	8-719-404-46	DIODE MA110	
< IC >			
IC901	8-759-823-41	IC LA7470M	
< JACK >			
J901	1-569-810-11	JACK (SMALL TYPE) (MIC)	
< TRANSISTOR >			
Q901	8-729-822-97	TRANSISTOR 2SC4211-5.6.7	
Q902	8-729-823-00	TRANSISTOR 2SA1622-5.6.7	
Q903	8-729-822-97	TRANSISTOR 2SC4211-5.6.7	
Q904	8-729-823-00	TRANSISTOR 2SA1622-5.6.7	
Q905	8-729-822-48	TRANSISTOR FC101	
Q906	8-729-822-48	TRANSISTOR FC101	
< RESISTOR >			
R901	1-216-825-11	METAL CHIP 2.2K 5% 1/16W	
R902	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R903	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R904	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R905	1-216-827-11	METAL CHIP 3.3K 5% 1/16W	
R906	1-216-837-11	METAL CHIP 22K 5% 1/16W	
R907	1-216-850-11	METAL CHIP 270K 5% 1/16W	
R908	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R909	1-216-834-11	METAL CHIP 12K 5% 1/16W	
R910	1-216-841-11	METAL CHIP 47K 5% 1/16W	
R911	1-216-832-11	METAL CHIP 8.2K 5% 1/16W	
R912	1-216-830-11	METAL CHIP 5.6K 5% 1/16W	
R913	1-216-831-11	METAL CHIP 6.8K 5% 1/16W	
R914	1-216-818-11	METAL CHIP 560 5% 1/16W	
R915	1-216-837-11	METAL CHIP 22K 5% 1/16W	
R916	1-216-839-11	METAL CHIP 33K 5% 1/16W	
R917	1-216-834-11	METAL CHIP 12K 5% 1/16W	
R918	1-216-824-11	METAL CHIP 1.8K 5% 1/16W	
R919	1-216-821-11	METAL CHIP 1K 5% 1/16W	
R920	1-216-864-11	METAL CHIP 0 5% 1/16W	
R951	1-216-825-11	METAL CHIP 2.2K 5% 1/16W	
R952	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R953	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R954	1-216-833-11	METAL CHIP 10K 5% 1/16W	

Ref. No.	Part No.	Description	Remark
R955	1-216-827-11	METAL CHIP 3.3K 5% 1/16W	
R956	1-216-837-11	METAL CHIP 22K 5% 1/16W	
R957	1-216-850-11	METAL CHIP 270K 5% 1/16W	
R958	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R959	1-216-834-11	METAL CHIP 12K 5% 1/16W	
R960	1-216-841-11	METAL CHIP 47K 5% 1/16W	
R961	1-216-832-11	METAL CHIP 8.2K 5% 1/16W	
R962	1-216-830-11	METAL CHIP 5.6K 5% 1/16W	
R963	1-216-831-11	METAL CHIP 6.8K 5% 1/16W	
R964	1-216-818-11	METAL CHIP 560 5% 1/16W	
R965	1-216-837-11	METAL CHIP 22K 5% 1/16W	
R966	1-216-839-11	METAL CHIP 33K 5% 1/16W	
R967	1-216-834-11	METAL CHIP 12K 5% 1/16W	
R968	1-216-824-11	METAL CHIP 1.8K 5% 1/16W	
R969	1-216-821-11	METAL CHIP 1K 5% 1/16W	
R970	1-216-864-11	METAL CHIP 0 5% 1/16W	
R990	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R991	1-216-821-11	METAL CHIP 1K 5% 1/16W	
R992	1-216-295-00	METAL CHIP 0 5% 1/10W	
R993	1-216-295-00	METAL CHIP 0 5% 1/10W	
R994	1-216-295-00	METAL CHIP 0 5% 1/10W	
< SWITCH >			
S901	1-572-391-11	SWITCH, SLIDE (WIND BUILT IN MIC)	

A-7071-473-A RM-56 BOARD, COMPLETE			

(Ref. No 6,000 Series)			
< CAPACITOR >			
C401	1-135-217-21	TANTALUM CHIP 15uF 20% 6.3V	
< CONNECTOR >			
CN401	* 1-566-758-11	PIN, CONNECTOR (PC BOARD) 3P	
< IC >			
IC401	8-741-100-64	IC SBX1621-51	
< RESISTOR >			
R401	1-216-017-00	METAL CHIP 47 5% 1/10W	

TI-40

Ref. No.	Part No.	Description	Remark
	A-7062-904-A	TI-40 BOARD, COMPLETE	

		(Ref. No 3,000 Series)	
		< CAPACITOR >	
C801	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C802	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V
C803	1-162-637-11	CERAMIC CHIP 0.47uF	16V
C804	1-162-913-11	CERAMIC CHIP 8PF	0.5PF 50V
C805	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C807	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C808	1-162-964-11	CERAMIC CHIP 0.001uF	10% 50V
C810	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V
C811	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C812	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C813	1-162-949-11	CERAMIC CHIP 47PF	5% 50V
C814	1-162-949-11	CERAMIC CHIP 47PF	5% 50V
C815	1-162-949-11	CERAMIC CHIP 47PF	5% 50V
C816	1-164-222-11	CERAMIC CHIP 0.22uF	25V
C817	1-162-921-11	CERAMIC CHIP 33PF	5% 50V
C818	1-162-949-11	CERAMIC CHIP 47PF	5% 50V
C819	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
		< CONNECTOR >	
CN801	1-580-088-11	CONNECTOR, BOARD TO BOARD 22P	
		< TRIMMER >	
CT801	1-141-424-11	CAP. ADJ	
CT802	1-141-424-11	CAP. ADJ	
		< DIODE >	
D801	8-713-300-88	DIODE 1T33C	
		< IC >	
IC801	8-759-507-53	IC MS6264CLL	
IC802	8-759-518-62	IC MB-90071-104-PF	
IC803	8-759-053-02	IC MB87818	
IC804	8-759-234-20	IC TC7S08F	
		< COIL >	
L801	1-410-377-31	INDUCTOR CHIP 4.7uH	
L802	1-410-384-31	INDUCTOR CHIP 18uH	
L803	1-410-387-11	INDUCTOR CHIP 33uH	
L804	1-410-381-11	INDUCTOR CHIP 10uH	
L805	1-410-381-11	INDUCTOR CHIP 10uH	

Ref. No.	Part No.	Description	Remark
		< TRANSISTOR >	
Q801	8-729-905-18	TRANSISTOR DTC144EU	
Q802	8-729-403-24	TRANSISTOR XN4210	
Q803	8-729-905-18	TRANSISTOR DTC144EU	
		< RESISTOR >	
R801	1-216-833-11	METAL CHIP 10K 5%	1/16W
R805	1-216-833-11	METAL CHIP 10K 5%	1/16W
R806	1-216-833-11	METAL CHIP 10K 5%	1/16W
R809	1-216-833-11	METAL CHIP 10K 5%	1/16W
R810	1-216-833-11	METAL CHIP 10K 5%	1/16W
R811	1-216-833-11	METAL CHIP 10K 5%	1/16W
R812	1-216-833-11	METAL CHIP 10K 5%	1/16W
R815	1-216-833-11	METAL CHIP 10K 5%	1/16W
R816	1-216-833-11	METAL CHIP 10K 5%	1/16W
R818	1-216-837-11	METAL CHIP 22K 5%	1/16W
R819	1-216-829-11	METAL CHIP 4.7K 5%	1/16W
R820	1-216-845-11	METAL CHIP 100K 5%	1/16W
R821	1-216-845-11	METAL CHIP 100K 5%	1/16W
R822	1-216-833-11	METAL CHIP 10K 5%	1/16W
R823	1-216-822-11	METAL CHIP 1.2K 5%	1/16W
R824	1-216-845-11	METAL CHIP 100K 5%	1/16W
R825	1-216-817-11	METAL CHIP 470 5%	1/16W
R826	1-216-825-11	METAL CHIP 2.2K 5%	1/16W
R827	1-216-825-11	METAL CHIP 2.2K 5%	1/16W
R828	1-216-825-11	METAL CHIP 2.2K 5%	1/16W
R829	1-216-825-11	METAL CHIP 2.2K 5%	1/16W
R830	1-216-817-11	METAL CHIP 470 5%	1/16W
R831	1-216-817-11	METAL CHIP 470 5%	1/16W
R832	1-216-817-11	METAL CHIP 470 5%	1/16W
R834	1-216-829-11	METAL CHIP 4.7K 5%	1/16W
R835	1-216-825-11	METAL CHIP 2.2K 5%	1/16W
R836	1-216-825-11	METAL CHIP 2.2K 5%	1/16W
R839	1-216-825-11	METAL CHIP 2.2K 5%	1/16W
		< NETWORK RESISTOR >	
RB801	1-236-424-11	NETWORK, RES 10K	
RB802	1-236-424-11	NETWORK, RES 10K	
RB804	1-236-424-11	NETWORK, RES 10K	
RB805	1-236-424-11	NETWORK, RES 10K	
RB806	1-236-416-11	NETWORK, RES 2.2K	

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
	A-7062-905-A	VC-106 BOARD, COMPLETE		C222	1-164-634-11	CERAMIC CHIP 1uF	16V
	*****			C223	1-164-360-11	CERAMIC CHIP 0.1uF	16V
		(Ref. No 1,000 Series)		C224	1-164-634-11	CERAMIC CHIP 1uF	16V
	3-946-052-01	COVER, FILTER		C225	1-162-638-11	CERAMIC CHIP 1uF	16V
	8-729-807-87	TRANSISTOR 2SB1295-UL6		C226	1-162-638-11	CERAMIC CHIP 1uF	16V
	< CAPACITOR >			C227	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C101	1-135-211-11	TANTAL. CHIP 6.8uF	20% 6.3V	C228	1-164-634-11	CERAMIC CHIP 1uF	16V
C102	1-126-206-11	ELECT CHIP 100uF	20% 6.3V	C229	1-164-634-11	CERAMIC CHIP 1uF	16V
C103	1-135-162-21	TANTALUM CHIP 33uF	20% 6.3V	C230	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C104	1-162-638-11	CERAMIC CHIP 1uF	16V	C231	1-164-634-11	CERAMIC CHIP 1uF	16V
C105	1-162-964-11	CERAMIC CHIP 0.001uF	10% 50V	C232	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C106	1-135-091-00	TANTALUM CHIP 1uF	20% 16V	C233	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C107	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V	C234	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C108	1-135-163-21	TANTAL. CHIP 47uF	20% 4V	C235	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C109	1-164-360-11	CERAMIC CHIP 0.1uF	16V	C236	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C110	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V	C237	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C111	1-135-181-21	TANTALUM CHIP 4.7uF	20% 6.3V	C238	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C112	1-162-909-11	CERAMIC CHIP 4PF	0.25PF 50V	C239	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C113	1-162-949-11	CERAMIC CHIP 47PF	5% 50V	C240	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C151	1-162-964-11	CERAMIC CHIP 0.001uF	10% 50V	C241	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C152	1-135-181-21	TANTALUM CHIP 4.7uF	20% 6.3V	C242	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C153	1-164-360-11	CERAMIC CHIP 0.1uF	16V	C243	1-135-217-21	TANTALUM CHIP 15uF	20% 6.3V
C154	1-135-148-21	TANTAL. CHIP 1.5uF	20% 10V	C251	1-164-634-11	CERAMIC CHIP 1uF	16V
C155	1-162-962-11	CERAMIC CHIP 470PF	10% 50V	C255	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C156	1-162-919-11	CERAMIC CHIP 22PF	5% 50V	C256	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C159	1-162-638-11	CERAMIC CHIP 1uF	16V	C257	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C201	1-162-945-11	CERAMIC CHIP 22PF	5% 50V	C258	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C202	1-164-360-11	CERAMIC CHIP 0.1uF	16V	C259	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C203	1-162-942-11	CERAMIC CHIP 12PF	5% 50V	C260	1-164-634-11	CERAMIC CHIP 1uF	16V
C204	1-164-360-11	CERAMIC CHIP 0.1uF	16V	C261	1-164-634-11	CERAMIC CHIP 1uF	16V
C205	1-164-634-11	CERAMIC CHIP 1uF	16V	C262	1-162-941-11	CERAMIC CHIP 10PF	0.5PF 50V
C206	1-135-181-21	TANTALUM CHIP 4.7uF	20% 6.3V	C263	1-164-634-11	CERAMIC CHIP 1uF	16V
C207	1-164-634-11	CERAMIC CHIP 1uF	16V	C264	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C208	1-164-634-11	CERAMIC CHIP 1uF	16V	C265	1-164-634-11	CERAMIC CHIP 1uF	16V
C209	1-164-360-11	CERAMIC CHIP 0.1uF	16V	C266	1-164-634-11	CERAMIC CHIP 1uF	16V
C210	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V	C267	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C211	1-164-634-11	CERAMIC CHIP 1uF	16V	C268	1-164-634-11	CERAMIC CHIP 1uF	16V
C212	1-164-634-11	CERAMIC CHIP 1uF	16V	C269	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C213	1-162-964-11	CERAMIC CHIP 0.001uF	10% 50V	C270	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C214	1-135-217-21	TANTALUM CHIP 15uF	20% 6.3V	C271	1-164-634-11	CERAMIC CHIP 1uF	16V
C215	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V	C272	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C216	1-135-211-11	TANTAL. CHIP 6.8uF	20% 6.3V	C273	1-162-974-11	CERAMIC CHIP 0.01uF	50V
C217	1-164-360-11	CERAMIC CHIP 0.1uF	16V	C274	1-162-974-11	CERAMIC CHIP 0.01uF	50V
C218	1-164-360-11	CERAMIC CHIP 0.1uF	16V	C275	1-135-162-21	TANTALUM CHIP 33uF	20% 6.3V
C219	1-164-360-11	CERAMIC CHIP 0.1uF	16V	C276	1-162-943-11	CERAMIC CHIP 15PF	5% 50V
C220	1-135-211-11	TANTAL. CHIP 6.8uF	20% 6.3V	C277	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C221	1-164-360-11	CERAMIC CHIP 0.1uF	16V	C278	1-164-634-11	CERAMIC CHIP 1uF	16V
				C280	1-164-634-11	CERAMIC CHIP 1uF	16V
				C281	1-164-634-11	CERAMIC CHIP 1uF	16V

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Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
C282	1-162-949-11	CERAMIC CHIP	47PF 5%	50V	C404	1-162-941-11	CERAMIC CHIP 10PF 0.5PF 50V
C283	1-164-634-11	CERAMIC CHIP	1uF	16V	C405	1-164-005-11	CERAMIC CHIP 0.47uF 25V
C284	1-164-634-11	CERAMIC CHIP	1uF	16V	C406	1-135-091-00	TANTALUM CHIP 1uF 20% 16V
C285	1-162-974-11	CERAMIC CHIP	0.01uF	50V	C407	1-164-005-11	CERAMIC CHIP 0.47uF 25V
C286	1-135-091-00	TANTALUM CHIP	1uF 20%	16V	C408	1-135-157-21	TANTALUM CHIP 10uF 20% 6.3V
C287	1-164-634-11	CERAMIC CHIP	1uF	16V	C409	1-135-149-21	TANTALUM CHIP 2.2uF 20% 10V
C288	1-162-974-11	CERAMIC CHIP	0.01uF	50V	C410	1-135-157-21	TANTALUM CHIP 10uF 20% 6.3V
C289	1-162-974-11	CERAMIC CHIP	0.01uF	50V	C411	1-162-974-11	CERAMIC CHIP 0.01uF 50V
C290	1-162-970-11	CERAMIC CHIP	0.01uF 10%	25V	C412	1-126-246-11	ELECT CHIP 220uF 20% 4V
C291	1-164-360-11	CERAMIC CHIP	0.1uF	16V	C413	1-164-182-11	CERAMIC CHIP 0.0033uF 10% 50V
C292	1-162-970-11	CERAMIC CHIP	0.01uF 10%	25V	C415	1-135-157-21	TANTALUM CHIP 10uF 20% 6.3V
C293	1-162-974-11	CERAMIC CHIP	0.01uF	50V	C416	1-162-974-11	CERAMIC CHIP 0.01uF 50V
C294	1-162-970-11	CERAMIC CHIP	0.01uF 10%	25V	C417	1-164-360-11	CERAMIC CHIP 0.1uF 16V
C295	1-164-360-11	CERAMIC CHIP	0.1uF	16V	C418	1-164-471-11	CERAMIC CHIP 680PF 5% 50V
C296	1-162-970-11	CERAMIC CHIP	0.01uF 10%	25V	C419	1-126-207-11	ELECT CHIP 33uF 20% 4V
C297	1-135-180-21	TANTALUM CHIP	3.3uF 20%	6.3V	C421	1-162-974-11	CERAMIC CHIP 0.01uF 50V
C298	1-135-180-21	TANTALUM CHIP	3.3uF 20%	6.3V	C422	1-162-974-11	CERAMIC CHIP 0.01uF 50V
C299	1-135-180-21	TANTALUM CHIP	3.3uF 20%	6.3V	C423	1-135-157-21	TANTALUM CHIP 10uF 20% 6.3V
C300	1-162-970-11	CERAMIC CHIP	0.01uF 10%	25V	C424	1-162-974-11	CERAMIC CHIP 0.01uF 50V
C301	1-164-360-11	CERAMIC CHIP	0.1uF	16V	C425	1-135-157-21	TANTALUM CHIP 10uF 20% 6.3V
C302	1-164-360-11	CERAMIC CHIP	0.1uF	16V	C426	1-164-005-11	CERAMIC CHIP 0.47uF 25V
C303	1-135-072-21	TANTALUM CHIP	0.22uF 10%	35V	C427	1-162-949-11	CERAMIC CHIP 47PF 5% 50V
C304	1-162-974-11	CERAMIC CHIP	0.01uF	50V	C428	1-162-952-11	CERAMIC CHIP 82PF 5% 50V
C305	1-164-360-11	CERAMIC CHIP	0.1uF	16V	C429	1-135-157-21	TANTALUM CHIP 10uF 20% 6.3V
C306	1-164-360-11	CERAMIC CHIP	0.1uF	16V	C430	1-162-974-11	CERAMIC CHIP 0.01uF 50V
C307	1-135-157-21	TANTALUM CHIP	10uF 20%	6.3V	C431	1-162-942-11	CERAMIC CHIP 12PF 5% 50V
C308	1-164-634-11	CERAMIC CHIP	1uF	16V	C432	1-135-157-21	TANTALUM CHIP 10uF 20% 6.3V
C309	1-164-360-11	CERAMIC CHIP	0.1uF	16V	C433	1-162-974-11	CERAMIC CHIP 0.01uF 50V
C310	1-164-360-11	CERAMIC CHIP	0.1uF	16V	C434	1-162-974-11	CERAMIC CHIP 0.01uF 50V
C351	1-162-974-11	CERAMIC CHIP	0.01uF	50V	C435	1-135-157-21	TANTALUM CHIP 10uF 20% 6.3V
C353	1-135-215-21	TANTAL. CHIP	6.8uF 20%	16V	C436	1-135-180-21	TANTALUM CHIP 3.3uF 20% 6.3V
C354	1-162-974-11	CERAMIC CHIP	0.01uF	50V	C437	1-135-157-21	TANTALUM CHIP 10uF 20% 6.3V
C355	1-135-091-00	TANTALUM CHIP	1uF 20%	16V	C438	1-162-974-11	CERAMIC CHIP 0.01uF 50V
C356	1-162-964-11	CERAMIC CHIP	0.001uF 10%	50V	C439	1-135-180-21	TANTALUM CHIP 3.3uF 20% 6.3V
C357	1-135-181-21	TANTALUM CHIP	4.7uF 20%	6.3V	C440	1-162-945-11	CERAMIC CHIP 22PF 5% 50V
C358	1-162-974-11	CERAMIC CHIP	0.01uF	50V	C441	1-162-941-11	CERAMIC CHIP 10PF 0.5PF 50V
C359	1-163-118-00	CERAMIC CHIP	110PF 5%	50V	C442	1-135-157-21	TANTALUM CHIP 10uF 20% 6.3V
C360	1-162-964-11	CERAMIC CHIP	0.001uF 10%	50V	C443	1-162-946-11	CERAMIC CHIP 27PF 5% 50V
C361	1-135-149-21	TANTALUM CHIP	2.2uF 20%	10V	C444	1-162-956-11	CERAMIC CHIP 180PF 5% 50V
C362	1-162-959-11	CERAMIC CHIP	330PF 5%	50V	C445	1-162-954-11	CERAMIC CHIP 120PF 5% 50V
C363	1-164-145-11	CERAMIC CHIP	390PF 5%	50V	C446	1-162-946-11	CERAMIC CHIP 27PF 5% 50V
C364	1-162-936-11	CERAMIC CHIP	5PF 0.25PF	50V	C447	1-135-181-21	TANTALUM CHIP 4.7uF 20% 6.3V
C365	1-162-974-11	CERAMIC CHIP	0.01uF	50V	C449	1-162-947-11	CERAMIC CHIP 33PF 5% 50V
C366	1-164-360-11	CERAMIC CHIP	0.1uF	16V	C450	1-163-131-00	CERAMIC CHIP 390PF 5% 50V
C367	1-162-947-11	CERAMIC CHIP	33PF 5%	50V	C451	1-163-263-11	CERAMIC CHIP 330PF 5% 50V
C368	1-164-360-11	CERAMIC CHIP	0.1uF	16V	C452	1-163-121-00	CERAMIC CHIP 150PF 5% 50V
C401	1-162-974-11	CERAMIC CHIP	0.01uF	50V	C453	1-163-121-00	CERAMIC CHIP 150PF 5% 50V
C402	1-135-157-21	TANTALUM CHIP	10uF 20%	6.3V	C454	1-162-974-11	CERAMIC CHIP 0.01uF 50V
C403	1-164-005-11	CERAMIC CHIP	0.47uF	25V	C455	1-135-157-21	TANTALUM CHIP 10uF 20% 6.3V

Ref. No.	Part No.	Description	Remark			Ref. No.	Part No.	Description	Remark		
C456	1-164-360-11	CERAMIC CHIP	0.1uF		16V	C559	1-164-634-11	CERAMIC CHIP	1uF		16V
C458	1-162-956-11	CERAMIC CHIP	180PF	5%	50V	C560	1-162-974-11	CERAMIC CHIP	0.01uF		50V
C459	1-162-949-11	CERAMIC CHIP	47PF	5%	50V	C561	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V
C460	1-128-004-11	ELECT CHIP	10uF	20%	16V	C562	1-162-949-11	CERAMIC CHIP	47PF	5%	50V
C461	1-135-181-21	TANTALUM CHIP	4.7uF	20%	6.3V	C563	1-162-953-11	CERAMIC CHIP	100PF	5%	50V
C462	1-162-957-11	CERAMIC CHIP	220PF	5%	50V	C564	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V
C463	1-162-957-11	CERAMIC CHIP	220PF	5%	50V	C566	1-135-180-21	TANTALUM CHIP	3.3uF	20%	6.3V
C464	1-162-944-11	CERAMIC CHIP	18PF	5%	50V	C567	1-162-974-11	CERAMIC CHIP	0.01uF		50V
C465	1-164-145-11	CERAMIC CHIP	390PF	5%	50V	C568	1-135-180-21	TANTALUM CHIP	3.3uF	20%	6.3V
C466	1-162-974-11	CERAMIC CHIP	0.01uF		50V	C569	1-164-360-11	CERAMIC CHIP	0.1uF		16V
C467	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V	C570	1-162-974-11	CERAMIC CHIP	0.01uF		50V
C468	1-162-948-11	CERAMIC CHIP	39PF	5%	50V	C571	1-135-180-21	TANTALUM CHIP	3.3uF	20%	6.3V
C502	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V	C572	1-162-974-11	CERAMIC CHIP	0.01uF		50V
C504	1-163-121-00	CERAMIC CHIP	150PF	5%	50V	C573	1-164-634-11	CERAMIC CHIP	1uF		16V
C505	1-162-949-11	CERAMIC CHIP	47PF	5%	50V	C574	1-162-974-11	CERAMIC CHIP	0.01uF		50V
C506	1-164-360-11	CERAMIC CHIP	0.1uF		16V	C575	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V
C507	1-162-967-11	CERAMIC CHIP	0.0033uF	10%	50V	C576	1-162-947-11	CERAMIC CHIP	33PF	5%	50V
C508	1-162-952-11	CERAMIC CHIP	82PF	5%	50V	C577	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V
C509	1-162-974-11	CERAMIC CHIP	0.01uF		50V	C578	1-164-360-11	CERAMIC CHIP	0.1uF		16V
C511	1-162-951-11	CERAMIC CHIP	68PF	5%	50V	C579	1-164-360-11	CERAMIC CHIP	0.1uF		16V
C512	1-162-950-11	CERAMIC CHIP	56PF	5%	50V	C601	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C513	1-162-957-11	CERAMIC CHIP	220PF	5%	50V	C602	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C514	1-162-953-11	CERAMIC CHIP	100PF	5%	50V	C603	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C515	1-162-974-11	CERAMIC CHIP	0.01uF		50V	C701	1-135-181-21	TANTALUM CHIP	4.7uF	20%	6.3V
C517	1-164-360-11	CERAMIC CHIP	0.1uF		16V	C702	1-162-995-11	CERAMIC CHIP	0.022uF		50V
C518	1-126-205-11	ELECT CHIP	47uF	20%	6.3V	C703	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C521	1-162-969-11	CERAMIC CHIP	0.0068uF	10%	25V	C731	1-162-959-11	CERAMIC CHIP	330PF	5%	50V
C522	1-135-091-00	TANTALUM CHIP	1uF	20%	16V	C732	1-162-954-11	CERAMIC CHIP	120PF	5%	50V
C523	1-135-091-00	TANTALUM CHIP	1uF	20%	16V	C733	1-162-952-11	CERAMIC CHIP	82PF	5%	50V
C524	1-135-146-21	TANTALUM CHIP	0.68uF	20%	25V	C734	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C525	1-162-995-11	CERAMIC CHIP	0.022uF		50V	C735	1-164-245-11	CERAMIC CHIP	0.015uF	10%	25V
C526	1-135-157-21	TANTALUM CHIP	10uF	20%	6.3V	C736	1-162-954-11	CERAMIC CHIP	120PF	5%	50V
C527	1-162-974-11	CERAMIC CHIP	0.01uF		50V	C737	1-164-634-11	CERAMIC CHIP	1uF		16V
C528	1-162-919-11	CERAMIC CHIP	22PF	5%	50V	C738	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C529	1-162-941-11	CERAMIC CHIP	10PF	0.5PF	50V	C739	1-162-959-11	CERAMIC CHIP	330PF	5%	50V
C530	1-162-912-11	CERAMIC CHIP	7PF	0.5PF	50V	C740	1-162-638-11	CERAMIC CHIP	1uF		16V
C531	1-162-910-11	CERAMIC CHIP	5PF	0.25PF	50V	C741	1-164-360-11	CERAMIC CHIP	0.1uF		16V
C532	1-162-974-11	CERAMIC CHIP	0.01uF		50V	C742	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C533	1-162-944-11	CERAMIC CHIP	18PF	5%	50V	C743	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C534	1-162-974-11	CERAMIC CHIP	0.01uF		50V	C744	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C535	1-162-952-11	CERAMIC CHIP	82PF	5%	50V	C745	1-164-360-11	CERAMIC CHIP	0.1uF		16V
C552	1-135-180-21	TANTALUM CHIP	3.3uF	20%	6.3V	C746	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C553	1-162-974-11	CERAMIC CHIP	0.01uF		50V	C747	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C554	1-135-180-21	TANTALUM CHIP	3.3uF	20%	6.3V	C748	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C555	1-164-360-11	CERAMIC CHIP	0.1uF		16V	C749	1-164-634-11	CERAMIC CHIP	1uF		16V
C556	1-162-974-11	CERAMIC CHIP	0.01uF		50V	C750	1-164-360-11	CERAMIC CHIP	0.1uF		16V
C557	1-135-180-21	TANTALUM CHIP	3.3uF	20%	6.3V	C751	1-164-360-11	CERAMIC CHIP	0.1uF		16V
C558	1-162-974-11	CERAMIC CHIP	0.01uF		50V	C752	1-135-181-21	TANTALUM CHIP	4.7uF	20%	6.3V

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Ref. No.	Part No.	Description	Remark
< CONNECTOR >			
CN101	1-580-247-61	CONNECTOR, BOARD TO BOARD 18P	
CN251	* 1-565-529-21	PIN, CONNECTOR (PC BOARD) 4P	
CN302	1-580-086-41	CONNECTOR, BOARD TO BOARD 22P	
CN701	1-573-564-61	CONNECTOR, BOARD TO BOARD 32P	
< TRIMMER >			
CT101	1-141-356-11	CAP. ADJ	
CT151	1-141-368-11	CAP. CHIP TRIMMER	
< DIODE >			
D152	8-719-949-46	DIODE 1T32	
D153	8-719-404-46	DIODE MA110	
D251	8-719-404-46	DIODE MA110	
D253	8-719-404-46	DIODE MA110	
D254	8-719-404-46	DIODE MA110	
D351	8-719-404-46	DIODE MA110	
D401	8-719-421-03	DIODE MA732	
D402	8-719-404-35	DIODE MA141WK	
D403	8-719-820-05	DIODE 1SS181	
D404	8-719-820-05	DIODE 1SS181	
D405	8-719-404-35	DIODE MA141WK	
D406	8-719-404-46	DIODE MA110	
D551	8-719-404-46	DIODE MA110	
D552	8-719-404-35	DIODE MA141WK	
D553	8-719-404-46	DIODE MA110	
< FILTER >			
FL201	1-236-759-21	FILTER, LOW PASS (TRAP)	
FL202	1-415-731-21	DELAY LINE, LC (YH)	
FL203	1-236-892-21	FILTER, LOW PASS	
FL204	1-415-732-21	DELAY LINE, LC (200NS)	
FL251	1-415-763-21	DELAY LINE, LC	
FL252	1-415-730-21	DELAY LINE, LC (100NS)	
FL351	1-236-850-21	FILTER, BAND PASS	
FL401	1-239-112-21	FILTER, LOW PASS (Y)	
FL402	1-236-775-11	FILTER, LOW PASS (DEM)	
FL501	1-239-110-11	FILTER, BAND PASS	
FL502	1-236-186-11	FILTER, BAND PASS	
FL503	1-579-371-11	FILTER, CERAMIC	
FL551	1-236-848-21	FILTER, LOW PASS	
FL552	1-239-010-11	FILTER, LOW PASS (CCD. PAL. Y)	
FL731	1-239-111-21	FILTER, LOW PASS	
< HIC >			
HIC101	A-7068-194-A	HIC DT-77 BOARD, COMPLETE (Note. 1)	

Note 1

For replacement of CCD imager, CD-74 board, complete and DT-77 board, complete read carefully the CAUTIONS FOR REPLACEMENT OF CCD IMAGER on page 88.

Ref. No.	Part No.	Description	Remark
< IC >			
IC151	8-752-339-77	IC CXD2111R-T3	
IC201	8-752-340-34	IC CXL1507AN	
IC202	8-752-332-69	IC CXL5504M	
IC203	8-752-038-97	IC CXA1391R	
IC204	8-759-946-00	IC MB88341PFV	
IC251	8-759-946-00	IC MB88341PFV	
IC252	8-752-056-04	IC CXA1609N	
IC253	8-752-039-49	IC CXA1393AN	
IC254	8-752-057-59	IC CXA1592R	
IC255	8-759-521-09	IC MB88346APFV	
IC256	8-759-512-59	IC MB88352PFV	
IC257	8-759-937-56	IC S-8054AL8-LM-S	
IC258	8-759-008-67	IC MC14066BF	
IC260	8-759-998-96	IC LM324D	
IC261	8-759-044-05	IC MC68HC11L6FUSC400607	
IC351	8-759-605-61	IC CXA1203N	
IC401	8-752-036-19	IC CXA1207AR	
IC501	8-752-036-20	IC CXA1208R	
IC551	8-752-333-24	IC CXL1506M	
IC552	8-752-333-24	IC CXL1506M	
IC701	8-752-348-74	IC CXD2104AN	
IC731	8-759-998-92	IC LM393D	
IC732	8-759-509-17	IC XRU4053BF	
IC733	8-759-998-98	IC LM358D	
< COIL >			
L101	1-412-031-11	INDUCTOR CHIP 47uH	
L102	1-412-031-11	INDUCTOR CHIP 47uH	
L151	1-410-381-11	INDUCTOR CHIP 10uH	
L201	1-410-381-11	INDUCTOR CHIP 10uH	
L202	1-410-381-11	INDUCTOR CHIP 10uH	
L203	1-410-381-11	INDUCTOR CHIP 10uH	
L204	1-410-381-11	INDUCTOR CHIP 10uH	
L251	1-410-391-11	INDUCTOR CHIP 68uH	
L252	1-410-381-11	INDUCTOR CHIP 10uH	
L351	1-412-029-11	INDUCTOR CHIP 10uH	
L401	1-410-393-11	INDUCTOR CHIP 100uH	
L402	1-412-029-11	INDUCTOR CHIP 10uH	
L404	1-410-383-31	INDUCTOR CHIP 15uH	
L405	1-410-390-11	INDUCTOR CHIP 56uH	
L407	1-410-386-11	INDUCTOR CHIP 27uH	
L408	1-410-378-11	INDUCTOR CHIP 5.6uH	
L410	1-410-386-11	INDUCTOR CHIP 27uH	
L411	1-410-376-21	INDUCTOR CHIP 3.9uH	
L412	1-410-384-31	INDUCTOR CHIP 18uH	
L413	1-410-379-31	INDUCTOR CHIP 6.8uH	
L414	1-410-390-11	INDUCTOR CHIP 56uH	

Ref. No.	Part No.	Description	Remark
L501	1-412-029-11	INDUCTOR CHIP 10uH	
L502	1-410-393-11	INDUCTOR CHIP 100uH	
L503	1-410-656-11	INDUCTOR CHIP 150uH	
L504	1-410-393-11	INDUCTOR CHIP 100uH	
L505	1-410-655-31	INDUCTOR CHIP 120uH	
L507	1-410-386-11	INDUCTOR CHIP 27uH	
L508	1-410-393-11	INDUCTOR CHIP 100uH	
L509	1-410-655-31	INDUCTOR CHIP 120uH	
L551	1-412-029-11	INDUCTOR CHIP 10uH	
L552	1-412-031-11	INDUCTOR CHIP 47uH	
L553	1-412-029-11	INDUCTOR CHIP 10uH	
L554	1-412-031-11	INDUCTOR CHIP 47uH	
L601	1-412-026-11	INDUCTOR CHIP 1uH	
L602	1-410-192-51	INDUCTOR CHIP 1uH	
L603	1-410-192-51	INDUCTOR CHIP 1uH	
L701	1-410-381-11	INDUCTOR CHIP 10uH	
L731	1-410-204-31	INDUCTOR CHIP 10uH	
L732	1-410-655-31	INDUCTOR CHIP 120uH	
< TRANSISTOR >			
Q101	8-729-907-46	TRANSISTOR 1M21	
Q102	8-729-907-46	TRANSISTOR 1M21	
Q103	8-729-907-46	TRANSISTOR 1M21	
Q104	8-729-925-42	TRANSISTOR 1M22	
Q105	8-729-907-46	TRANSISTOR 1M21	
Q106	8-729-907-46	TRANSISTOR 1M21	
Q107	8-729-402-45	TRANSISTOR UN5212	
Q108	8-729-905-35	TRANSISTOR 2SC4081-R	
Q151	8-729-905-35	TRANSISTOR 2SC4081-R	
Q201	8-729-905-23	TRANSISTOR 2SA1576-R	
Q202	8-729-905-23	TRANSISTOR 2SA1576-R	
Q203	8-729-925-42	TRANSISTOR 1M22	
Q204	8-729-905-23	TRANSISTOR 2SA1576-R	
Q205	8-729-905-23	TRANSISTOR 2SA1576-R	
Q251	8-729-907-46	TRANSISTOR 1M21	
Q252	8-729-905-18	TRANSISTOR DTC144EU	
Q253	8-729-905-23	TRANSISTOR 2SA1576-R	
Q254	8-729-905-35	TRANSISTOR 2SC4081-R	
Q255	8-729-907-46	TRANSISTOR 1M21	
Q256	8-729-905-23	TRANSISTOR 2SA1576-R	
Q259	8-729-925-39	TRANSISTOR 1MH8	
Q260	8-729-925-42	TRANSISTOR 1M22	
Q261	8-729-420-50	TRANSISTOR UN5215	
Q262	8-729-905-35	TRANSISTOR 2SC4081-R	
Q263	8-729-925-39	TRANSISTOR 1MH8	
Q264	8-729-420-50	TRANSISTOR UN5215	
Q351	8-729-905-12	TRANSISTOR DTA144EU	
Q352	8-729-905-18	TRANSISTOR DTC144EU	
Q353	8-729-905-35	TRANSISTOR 2SC4081-R	

Ref. No.	Part No.	Description	Remark
Q354	8-729-905-35	TRANSISTOR 2SC4081-R	
Q355	8-729-905-35	TRANSISTOR 2SC4081-R	
Q356	8-729-905-18	TRANSISTOR DTC144EU	
Q401	8-729-920-48	TRANSISTOR 1MH2	
Q402	8-729-907-39	TRANSISTOR 1M22	
Q403	8-729-905-23	TRANSISTOR 2SA1576-R	
Q404	8-729-905-18	TRANSISTOR DTC144EU	
Q405	8-729-824-05	TRANSISTOR 3SK248	
Q406	8-729-905-18	TRANSISTOR DTC144EU	
Q408	8-729-905-12	TRANSISTOR DTA144EU	
Q409	8-729-824-02	TRANSISTOR 2SA1838-TL	
Q410	8-729-905-12	TRANSISTOR DTA144EU	
Q411	8-729-403-06	TRANSISTOR XN1113	
Q412	8-729-905-18	TRANSISTOR DTC144EU	
Q413	8-729-905-18	TRANSISTOR DTC144EU	
Q414	8-729-423-52	TRANSISTOR 2SC3931	
Q415	8-729-824-02	TRANSISTOR 2SA1838	
Q416	8-729-905-18	TRANSISTOR DTC144EU	
Q417	8-729-905-35	TRANSISTOR 2SC4081-R	
Q418	8-729-905-23	TRANSISTOR 2SA1576-R	
Q419	8-729-905-23	TRANSISTOR 2SA1576-R	
Q420	8-729-905-35	TRANSISTOR 2SC4081-R	
Q421	8-729-905-18	TRANSISTOR DTC144EU	
Q422	8-729-823-16	TRANSISTOR 2SC4555-5. 6. 7	
Q423	8-729-823-16	TRANSISTOR 2SC4555-5. 6. 7	
Q424	8-729-905-18	TRANSISTOR DTC144EU	
Q425	8-729-905-18	TRANSISTOR DTC144EU	
Q426	8-729-905-12	TRANSISTOR DTA144EU	
Q427	8-729-905-18	TRANSISTOR DTC144EU	
Q428	8-729-905-18	TRANSISTOR DTC144EU	
Q429	8-729-905-18	TRANSISTOR DTC144EU	
Q430	8-729-423-52	TRANSISTOR 2SC3931	
Q431	8-729-423-52	TRANSISTOR 2SC3931	
Q432	8-729-907-26	TRANSISTOR 1MX1	
Q433	8-729-905-35	TRANSISTOR 2SC4081-R	
Q434	8-729-905-35	TRANSISTOR 2SC4081-R	
Q435	8-729-905-12	TRANSISTOR DTA144EU	
Q437	8-729-403-06	TRANSISTOR XN1113	
Q438	8-729-423-52	TRANSISTOR 2SC3931	
Q439	8-729-920-99	TRANSISTOR DTA114EU	
Q440	8-729-905-23	TRANSISTOR 2SA1576-R	
Q441	8-729-403-06	TRANSISTOR XN1113	
Q442	8-729-403-07	TRANSISTOR XN1213	
Q443	8-729-905-18	TRANSISTOR DTC144EU	
Q444	8-729-905-18	TRANSISTOR DTC144EU	
Q446	8-729-905-18	TRANSISTOR DTC144EU	
Q447	8-729-905-18	TRANSISTOR DTC144EU	
Q501	8-729-905-35	TRANSISTOR 2SC4081-R	
Q502	8-729-905-35	TRANSISTOR 2SC4081-R	

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Ref. No.	Part No.	Description	Remark
Q505	8-729-905-23	TRANSISTOR 2SA1576-R	
Q506	8-729-905-35	TRANSISTOR 2SC4081-R	
Q507	8-729-905-35	TRANSISTOR 2SC4081-R	
Q508	8-729-905-35	TRANSISTOR 2SC4081-R	
Q509	8-729-905-12	TRANSISTOR DTA144EU	
Q510	8-729-423-52	TRANSISTOR 2SC3931	
Q511	8-729-905-18	TRANSISTOR DTC144EU	
Q512	8-729-905-35	TRANSISTOR 2SC4081-R	
Q513	8-729-905-18	TRANSISTOR DTC144EU	
Q514	8-729-905-18	TRANSISTOR DTC144EU	
Q551	8-729-807-87	TRANSISTOR 2SB1295-UL6	
Q552	8-729-905-18	TRANSISTOR DTC144EU	
Q553	8-729-807-87	TRANSISTOR 2SB1295-UL6	
Q554	8-729-905-18	TRANSISTOR DTC144EU	
Q555	8-729-905-23	TRANSISTOR 2SA1576-R	
Q556	8-729-905-35	TRANSISTOR 2SC4081-R	
Q557	8-729-905-35	TRANSISTOR 2SC4081-R	
Q558	8-729-905-18	TRANSISTOR DTC144EU	
Q559	8-729-905-23	TRANSISTOR 2SA1576-R	
Q560	8-729-905-35	TRANSISTOR 2SC4081-R	
Q701	8-729-907-46	TRANSISTOR 1M21	
Q731	8-729-920-59	TRANSISTOR 1M22	
Q733	8-729-905-35	TRANSISTOR 2SC4081-R	
Q734	8-729-905-23	TRANSISTOR 2SA1576-R	
Q735	8-729-920-59	TRANSISTOR 1M22	
Q736	8-729-920-59	TRANSISTOR 1M22	
Q737	8-729-907-46	TRANSISTOR 1M21	
Q738	8-729-905-23	TRANSISTOR 2SA1576-R	
Q739	8-729-905-35	TRANSISTOR 2SC4081-R	
Q740	8-729-920-59	TRANSISTOR 1M22	
Q741	8-729-905-35	TRANSISTOR 2SC4081-R	

< RESISTOR >

R101	1-216-845-11	METAL CHIP	100K	5%	1/16W
R102	1-216-864-11	METAL CHIP	0	5%	1/16W
R103	1-216-845-11	METAL CHIP	100K	5%	1/16W
R104	1-216-841-11	METAL CHIP	47K	5%	1/16W
R105	1-216-837-11	METAL CHIP	22K	5%	1/16W
R106	1-216-864-11	METAL CHIP	0	5%	1/16W
R107	1-216-795-11	METAL CHIP	6.8K	0.50%	1/16W
R108	1-216-837-11	METAL CHIP	22K	5%	1/16W
R109	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R110	1-216-795-11	METAL CHIP	6.8K	0.50%	1/16W
R111	1-216-864-11	METAL CHIP	0	5%	1/16W
R113	1-216-841-11	METAL CHIP	47K	5%	1/16W
R114	1-216-864-11	METAL CHIP	0	5%	1/16W
R115	1-216-839-11	METAL CHIP	33K	5%	1/16W
R116	1-216-825-11	METAL CHIP	2.2K	5%	1/16W

R118	1-216-835-11	METAL CHIP	15K	5%	1/16W
R119	1-216-839-11	METAL CHIP	33K	5%	1/16W
R120	1-216-845-11	METAL CHIP	100K	5%	1/16W
R121	1-216-837-11	METAL CHIP	22K	5%	1/16W
R122	1-216-820-11	METAL CHIP	820	5%	1/16W
R123	1-216-833-11	METAL CHIP	10K	5%	1/16W
R124	1-216-841-11	METAL CHIP	47K	5%	1/16W
R125	1-216-845-11	METAL CHIP	100K	5%	1/16W
R126	1-216-837-11	METAL CHIP	22K	5%	1/16W
R127	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R129	1-216-836-11	METAL CHIP	18K	5%	1/16W
R130	1-216-837-11	METAL CHIP	22K	5%	1/16W
R131	1-216-822-11	METAL CHIP	1.2K	5%	1/16W
R132	1-216-835-11	METAL CHIP	15K	5%	1/16W
R133	1-216-842-11	METAL CHIP	56K	5%	1/16W
R134	1-216-864-11	METAL CHIP	0	5%	1/16W
R135	1-216-833-11	METAL CHIP	10K	5%	1/16W
R136	1-216-833-11	METAL CHIP	10K	5%	1/16W
R137	1-216-840-11	METAL CHIP	39K	5%	1/16W
R138	1-216-833-11	METAL CHIP	10K	5%	1/16W
R139	1-216-833-11	METAL CHIP	10K	5%	1/16W
R140	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R141	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R142	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R143	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R144	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R151	1-216-821-11	METAL CHIP	1K	5%	1/16W
R152	1-216-811-11	METAL CHIP	150	5%	1/16W
R153	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R154	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R155	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R156	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R157	1-216-864-11	METAL CHIP	0	5%	1/16W
R158	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R159	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R160	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R163	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R168	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R169	1-216-833-11	METAL CHIP	10K	5%	1/16W
R170	1-216-849-11	METAL CHIP	220K	5%	1/16W
R171	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R172	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R175	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R176	1-216-821-11	METAL CHIP	1K	5%	1/16W
R177	1-216-864-11	METAL CHIP	0	5%	1/16W
R178	1-216-845-11	METAL CHIP	100K	5%	1/16W
R182	1-216-833-11	METAL CHIP	10K	5%	1/16W
R201	1-216-820-11	METAL CHIP	820	5%	1/16W
R203	1-216-864-11	METAL CHIP	0	5%	1/16W

Ref. No.	Part No.	Description	Remark			Ref. No.	Part No.	Description	Remark		
R205	1-216-825-11	METAL CHIP	2.2K	5%	1/16W	R282	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R206	1-216-821-11	METAL CHIP	1K	5%	1/16W	R284	1-216-821-11	METAL CHIP	1K	5%	1/16W
R208	1-216-821-11	METAL CHIP	1K	5%	1/16W						
R209	1-216-821-11	METAL CHIP	1K	5%	1/16W	R285	1-216-821-11	METAL CHIP	1K	5%	1/16W
R211	1-216-857-11	METAL CHIP	1M	5%	1/16W	R286	1-216-833-11	METAL CHIP	10K	5%	1/16W
R212	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R288	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
						R289	1-216-821-11	METAL CHIP	1K	5%	1/16W
R213	1-216-835-11	METAL CHIP	15K	5%	1/16W	R290	1-216-817-11	METAL CHIP	470	5%	1/16W
R214	1-216-835-11	METAL CHIP	15K	5%	1/16W						
R215	1-216-836-11	METAL CHIP	18K	5%	1/16W	R291	1-216-833-11	METAL CHIP	10K	5%	1/16W
R216	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R294	1-216-864-11	METAL CHIP	0	5%	1/16W
R217	1-216-821-11	METAL CHIP	1K	5%	1/16W	R297	1-216-864-11	METAL CHIP	0	5%	1/16W
						R301	1-216-837-11	METAL CHIP	22K	5%	1/16W
R218	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R302	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R219	1-216-829-11	METAL CHIP	4.7K	5%	1/16W						
R220	1-216-836-11	METAL CHIP	18K	5%	1/16W	R303	1-216-841-11	METAL CHIP	47K	5%	1/16W
R221	1-216-839-11	METAL CHIP	33K	5%	1/16W	R304	1-216-828-11	METAL CHIP	3.9K	5%	1/16W
R223	1-216-864-11	METAL CHIP	0	5%	1/16W	R305	1-216-828-11	METAL CHIP	3.9K	5%	1/16W
						R306	1-216-841-11	METAL CHIP	47K	5%	1/16W
R224	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R307	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R226	1-216-840-11	METAL CHIP	39K	5%	1/16W						
R227	1-216-839-11	METAL CHIP	33K	5%	1/16W	R308	1-216-821-11	METAL CHIP	1K	5%	1/16W
R228	1-216-835-11	METAL CHIP	15K	5%	1/16W	R309	1-216-857-11	METAL CHIP	1M	5%	1/16W
R229	1-216-839-11	METAL CHIP	33K	5%	1/16W	R310	1-216-821-11	METAL CHIP	1K	5%	1/16W
						R311	1-216-845-11	METAL CHIP	100K	5%	1/16W
R231	1-216-839-11	METAL CHIP	33K	5%	1/16W	R312	1-216-833-11	METAL CHIP	10K	5%	1/16W
R232	1-216-837-11	METAL CHIP	22K	5%	1/16W						
R233	1-216-821-11	METAL CHIP	1K	5%	1/16W	R313	1-216-837-11	METAL CHIP	22K	5%	1/16W
R234	1-216-837-11	METAL CHIP	22K	5%	1/16W	R314	1-216-833-11	METAL CHIP	10K	5%	1/16W
R235	1-216-836-11	METAL CHIP	18K	5%	1/16W	R315	1-216-833-11	METAL CHIP	10K	5%	1/16W
						R316	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R241	1-216-833-11	METAL CHIP	10K	5%	1/16W	R318	1-216-821-11	METAL CHIP	1K	5%	1/16W
R242	1-216-833-11	METAL CHIP	10K	5%	1/16W						
R243	1-216-833-11	METAL CHIP	10K	5%	1/16W	R319	1-216-821-11	METAL CHIP	1K	5%	1/16W
R244	1-216-847-11	METAL CHIP	150K	5%	1/16W	R320	1-216-845-11	METAL CHIP	100K	5%	1/16W
R245	1-216-833-11	METAL CHIP	10K	5%	1/16W	R322	1-216-845-11	METAL CHIP	100K	5%	1/16W
						R323	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R251	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R324	1-216-845-11	METAL CHIP	100K	5%	1/16W
R256	1-216-831-11	METAL CHIP	6.8K	5%	1/16W						
R258	1-216-831-11	METAL CHIP	6.8K	5%	1/16W	R325	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R259	1-216-825-11	METAL CHIP	2.2K	5%	1/16W	R326	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R266	1-216-837-11	METAL CHIP	22K	5%	1/16W	R327	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
						R328	1-216-819-11	METAL CHIP	680	5%	1/16W
R267	1-216-840-11	METAL CHIP	39K	5%	1/16W	R329	1-216-819-11	METAL CHIP	680	5%	1/16W
R268	1-216-831-11	METAL CHIP	6.8K	5%	1/16W						
R269	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R330	1-216-845-11	METAL CHIP	100K	5%	1/16W
R270	1-216-839-11	METAL CHIP	33K	5%	1/16W	R331	1-216-819-11	METAL CHIP	680	5%	1/16W
R273	1-216-839-11	METAL CHIP	33K	5%	1/16W	R332	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
						R333	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R274	1-216-835-11	METAL CHIP	15K	5%	1/16W	R334	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R275	1-216-864-11	METAL CHIP	0	5%	1/16W						
R276	1-216-841-11	METAL CHIP	47K	5%	1/16W	R335	1-216-828-11	METAL CHIP	3.9K	5%	1/16W
R277	1-216-830-11	METAL CHIP	5.6K	5%	1/16W	R336	1-216-833-11	METAL CHIP	10K	5%	1/16W
R278	1-216-821-11	METAL CHIP	1K	5%	1/16W	R338	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
						R339	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R279	1-216-822-11	METAL CHIP	1.2K	5%	1/16W	R340	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R280	1-216-828-11	METAL CHIP	3.9K	5%	1/16W						
R281	1-216-825-11	METAL CHIP	2.2K	5%	1/16W	R343	1-216-857-11	METAL CHIP	1M	5%	1/16W

Ref. No.	Part No.	Description	Remark			Ref. No.	Part No.	Description	Remark		
R344	1-216-857-11	METAL CHIP	1M	5%	1/16W	R422	1-216-836-11	METAL CHIP	18K	5%	1/16W
R347	1-216-833-11	METAL CHIP	10K	5%	1/16W	R423	1-216-821-11	METAL CHIP	1K	5%	1/16W
R349	1-216-840-11	METAL CHIP	39K	5%	1/16W	R425	1-216-830-11	METAL CHIP	5.6K	5%	1/16W
R352	1-216-845-11	METAL CHIP	100K	5%	1/16W	R426	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R353	1-216-845-11	METAL CHIP	100K	5%	1/16W	R427	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R354	1-216-845-11	METAL CHIP	100K	5%	1/16W	R428	1-216-653-11	METAL CHIP	1.2K	0.5%	1/10W
R355	1-216-845-11	METAL CHIP	100K	5%	1/16W	R429	1-216-663-11	METAL CHIP	3.3K	0.5%	1/10W
R356	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R430	1-216-841-11	METAL CHIP	47K	5%	1/16W
R357	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R431	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R358	1-216-699-11	METAL CHIP	100K	0.5%	1/10W	R432	1-216-836-11	METAL CHIP	18K	5%	1/16W
R359	1-216-825-11	METAL CHIP	2.2K	5%	1/16W	R433	1-216-832-11	METAL CHIP	8.2K	5%	1/16W
R360	1-216-833-11	METAL CHIP	10K	5%	1/16W	R434	1-216-821-11	METAL CHIP	1K	5%	1/16W
R361	1-216-832-11	METAL CHIP	8.2K	5%	1/16W	R435	1-216-821-11	METAL CHIP	1K	5%	1/16W
R362	1-216-831-11	METAL CHIP	6.8K	5%	1/16W	R436	1-216-828-11	METAL CHIP	3.9K	5%	1/16W
R363	1-216-827-11	METAL CHIP	3.3K	5%	1/16W	R437	1-216-828-11	METAL CHIP	3.9K	5%	1/16W
R364	1-216-821-11	METAL CHIP	1K	5%	1/16W	R438	1-216-821-11	METAL CHIP	1K	5%	1/16W
R365	1-216-821-11	METAL CHIP	1K	5%	1/16W	R439	1-216-838-11	METAL CHIP	27K	5%	1/16W
R366	1-216-839-11	METAL CHIP	33K	5%	1/16W	R440	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R367	1-216-833-11	METAL CHIP	10K	5%	1/16W	R441	1-216-815-11	METAL CHIP	330	5%	1/16W
R368	1-216-819-11	METAL CHIP	680	5%	1/16W	R442	1-216-814-11	METAL CHIP	270	5%	1/16W
R369	1-216-817-11	METAL CHIP	470	5%	1/16W	R443	1-216-832-11	METAL CHIP	8.2K	5%	1/16W
R370	1-216-825-11	METAL CHIP	2.2K	5%	1/16W	R444	1-216-821-11	METAL CHIP	1K	5%	1/16W
R371	1-216-833-11	METAL CHIP	10K	5%	1/16W	R445	1-216-833-11	METAL CHIP	10K	5%	1/16W
R372	1-216-825-11	METAL CHIP	2.2K	5%	1/16W	R446	1-216-814-11	METAL CHIP	270	5%	1/16W
R373	1-216-826-11	METAL CHIP	2.7K	5%	1/16W	R447	1-216-813-11	METAL CHIP	220	5%	1/16W
R374	1-216-828-11	METAL CHIP	3.9K	5%	1/16W	R448	1-216-813-11	METAL CHIP	220	5%	1/16W
R375	1-216-821-11	METAL CHIP	1K	5%	1/16W	R449	1-216-833-11	METAL CHIP	10K	5%	1/16W
R377	1-216-864-11	METAL CHIP	0	5%	1/16W	R450	1-216-833-11	METAL CHIP	10K	5%	1/16W
R378	1-216-819-11	METAL CHIP	680	5%	1/16W	R451	1-216-813-11	METAL CHIP	220	5%	1/16W
R400	1-216-864-11	METAL CHIP	0	5%	1/16W	R452	1-216-816-11	METAL CHIP	390	5%	1/16W
R401	1-216-841-11	METAL CHIP	47K	5%	1/16W	R453	1-216-821-11	METAL CHIP	1K	5%	1/16W
R402	1-216-841-11	METAL CHIP	47K	5%	1/16W	R454	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R403	1-216-831-11	METAL CHIP	6.8K	5%	1/16W	R455	1-216-817-11	METAL CHIP	470	5%	1/16W
R404	1-216-832-11	METAL CHIP	8.2K	5%	1/16W	R457	1-216-815-11	METAL CHIP	330	5%	1/16W
R405	1-216-856-11	METAL CHIP	820K	5%	1/16W	R458	1-216-817-11	METAL CHIP	470	5%	1/16W
R406	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R459	1-216-837-11	METAL CHIP	22K	5%	1/16W
R407	1-216-817-11	METAL CHIP	470	5%	1/16W	R460	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R408	1-216-821-11	METAL CHIP	1K	5%	1/16W	R461	1-216-841-11	METAL CHIP	47K	5%	1/16W
R409	1-216-820-11	METAL CHIP	820	5%	1/16W	R462	1-216-841-11	METAL CHIP	47K	5%	1/16W
R410	1-216-821-11	METAL CHIP	1K	5%	1/16W	R463	1-216-841-11	METAL CHIP	47K	5%	1/16W
R411	1-216-804-11	METAL CHIP	39	5%	1/16W	R464	1-216-643-11	METAL CHIP	470	0.5%	1/10W
R412	1-216-803-11	METAL CHIP	33	5%	1/16W	R465	1-216-641-11	METAL CHIP	390	0.5%	1/10W
R413	1-216-699-11	METAL CHIP	100K	0.5%	1/10W	R466	1-216-841-11	METAL CHIP	47K	5%	1/16W
R414	1-216-853-11	METAL CHIP	470K	5%	1/16W	R467	1-216-841-11	METAL CHIP	47K	5%	1/16W
R415	1-216-845-11	METAL CHIP	100K	5%	1/16W	R468	1-216-841-11	METAL CHIP	47K	5%	1/16W
R417	1-216-850-11	METAL CHIP	270K	5%	1/16W	R469	1-216-663-11	METAL CHIP	3.3K	0.5%	1/10W
R419	1-216-818-11	METAL CHIP	560	5%	1/16W	R470	1-216-667-11	METAL CHIP	4.7K	0.5%	1/10W
R420	1-216-821-11	METAL CHIP	1K	5%	1/16W	R471	1-216-647-11	METAL CHIP	680	0.5%	1/10W
R421	1-216-839-11	METAL CHIP	33K	5%	1/16W	R472	1-216-844-11	METAL CHIP	82K	5%	1/16W

Ref. No.	Part No.	Description	Remark			Ref. No.	Part No.	Description	Remark		
R473	1-216-844-11	METAL CHIP	82K	5%	1/16W	R527	1-216-830-11	METAL CHIP	5.6K	5%	1/16W
R474	1-216-667-11	METAL CHIP	4.7K	0.5%	1/10W	R528	1-216-830-11	METAL CHIP	5.6K	5%	1/16W
R475	1-216-849-11	METAL CHIP	220K	5%	1/16W						
R476	1-216-665-11	METAL CHIP	3.9K	0.5%	1/10W	R529	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R477	1-216-649-11	METAL CHIP	820	0.5%	1/10W	R530	1-216-817-11	METAL CHIP	470	5%	1/16W
R478	1-216-833-11	METAL CHIP	10K	5%	1/16W	R531	1-216-834-11	METAL CHIP	12K	5%	1/16W
						R532	1-216-834-11	METAL CHIP	12K	5%	1/16W
R479	1-216-827-11	METAL CHIP	3.3K	5%	1/16W	R533	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R480	1-216-826-11	METAL CHIP	2.7K	5%	1/16W						
R481	1-216-821-11	METAL CHIP	1K	5%	1/16W	R534	1-216-864-11	METAL CHIP	0	5%	1/16W
R482	1-216-821-11	METAL CHIP	1K	5%	1/16W	R535	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R483	1-216-827-11	METAL CHIP	3.3K	5%	1/16W	R536	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
						R537	1-216-822-11	METAL CHIP	1.2K	5%	1/16W
R484	1-216-826-11	METAL CHIP	2.7K	5%	1/16W	R540	1-216-845-11	METAL CHIP	100K	5%	1/16W
R485	1-216-821-11	METAL CHIP	1K	5%	1/16W						
R486	1-216-819-11	METAL CHIP	680	5%	1/16W	R541	1-216-826-11	METAL CHIP	2.7K	5%	1/16W
R487	1-216-817-11	METAL CHIP	470	5%	1/16W	R542	1-216-807-11	METAL CHIP	68	5%	1/16W
R488	1-216-836-11	METAL CHIP	18K	5%	1/16W	R543	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
						R544	1-216-837-11	METAL CHIP	22K	5%	1/16W
R489	1-216-837-11	METAL CHIP	22K	5%	1/16W	R545	1-216-809-11	METAL CHIP	100	5%	1/16W
R490	1-216-829-11	METAL CHIP	4.7K	5%	1/16W						
R491	1-216-813-11	METAL CHIP	220	5%	1/16W	R546	1-216-845-11	METAL CHIP	100K	5%	1/16W
R492	1-216-813-11	METAL CHIP	220	5%	1/16W	R547	1-216-864-11	METAL CHIP	0	5%	1/16W
R493	1-216-814-11	METAL CHIP	270	5%	1/16W	R549	1-216-842-11	METAL CHIP	56K	5%	1/16W
						R550	1-216-841-11	METAL CHIP	47K	5%	1/16W
R494	1-216-828-11	METAL CHIP	3.9K	5%	1/16W	R551	1-216-833-11	METAL CHIP	10K	5%	1/16W
R495	1-216-817-11	METAL CHIP	470	5%	1/16W						
R497	1-216-822-11	METAL CHIP	1.2K	5%	1/16W	R552	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R498	1-216-813-11	METAL CHIP	220	5%	1/16W	R553	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R499	1-216-817-11	METAL CHIP	470	5%	1/16W	R554	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
						R555	1-216-810-11	METAL CHIP	120	5%	1/16W
R500	1-216-815-11	METAL CHIP	330	5%	1/16W	R556	1-216-844-11	METAL CHIP	82K	5%	1/16W
R501	1-216-819-11	METAL CHIP	680	5%	1/16W						
R502	1-216-836-11	METAL CHIP	18K	5%	1/16W	R557	1-216-864-11	METAL CHIP	0	5%	1/16W
R503	1-216-841-11	METAL CHIP	47K	5%	1/16W	R559	1-216-857-11	METAL CHIP	1M	5%	1/16W
R504	1-216-825-11	METAL CHIP	2.2K	5%	1/16W	R561	1-216-864-11	METAL CHIP	0	5%	1/16W
						R563	1-216-839-11	METAL CHIP	33K	5%	1/16W
R505	1-216-825-11	METAL CHIP	2.2K	5%	1/16W	R564	1-216-842-11	METAL CHIP	56K	5%	1/16W
R507	1-216-864-11	METAL CHIP	0	5%	1/16W						
R509	1-216-864-11	METAL CHIP	0	5%	1/16W	R565	1-216-817-11	METAL CHIP	470	5%	1/16W
R510	1-216-833-11	METAL CHIP	10K	5%	1/16W	R566	1-216-821-11	METAL CHIP	1K	5%	1/16W
R511	1-216-825-11	METAL CHIP	2.2K	5%	1/16W	R567	1-216-821-11	METAL CHIP	1K	5%	1/16W
						R568	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R512	1-216-815-11	METAL CHIP	330	5%	1/16W	R569	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R513	1-216-829-11	METAL CHIP	4.7K	5%	1/16W						
R514	1-216-821-11	METAL CHIP	1K	5%	1/16W	R570	1-216-821-11	METAL CHIP	1K	5%	1/16W
R516	1-216-821-11	METAL CHIP	1K	5%	1/16W	R571	1-216-821-11	METAL CHIP	1K	5%	1/16W
R517	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R572	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
						R573	1-216-810-11	METAL CHIP	120	5%	1/16W
R518	1-216-833-11	METAL CHIP	10K	5%	1/16W	R574	1-216-844-11	METAL CHIP	82K	5%	1/16W
R520	1-216-699-11	METAL CHIP	100K	0.5%	1/10W						
R521	1-216-821-11	METAL CHIP	1K	5%	1/16W	R575	1-216-864-11	METAL CHIP	0	5%	1/16W
R522	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R577	1-216-853-11	METAL CHIP	470K	5%	1/16W
R523	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R578	1-216-857-11	METAL CHIP	1M	5%	1/16W
						R579	1-216-864-11	METAL CHIP	0	5%	1/16W
R524	1-216-828-11	METAL CHIP	3.9K	5%	1/16W	R580	1-216-839-11	METAL CHIP	33K	5%	1/16W
R525	1-216-830-11	METAL CHIP	5.6K	5%	1/16W						
R526	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R581	1-216-842-11	METAL CHIP	56K	5%	1/16W

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Ref. No.	Part No.	Description	Remark		
R582	1-216-817-11	METAL CHIP	470	5%	1/16W
R583	1-216-826-11	METAL CHIP	2.7K	5%	1/16W
R584	1-216-821-11	METAL CHIP	1K	5%	1/16W
R585	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R586	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R587	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R588	1-216-818-11	METAL CHIP	560	5%	1/16W
R612	1-216-819-11	METAL CHIP	680	5%	1/16W
R613	1-216-819-11	METAL CHIP	680	5%	1/16W
R614	1-216-819-11	METAL CHIP	680	5%	1/16W
R616	1-216-864-11	METAL CHIP	0	5%	1/16W
R617	1-216-833-11	METAL CHIP	10K	5%	1/16W
R618	1-216-833-11	METAL CHIP	10K	5%	1/16W
R622	1-216-864-11	METAL CHIP	0	5%	1/16W
R626	1-216-864-11	METAL CHIP	0	5%	1/16W
R628	1-216-864-11	METAL CHIP	0	5%	1/16W
R702	1-216-821-11	METAL CHIP	1K	5%	1/16W
R703	1-216-821-11	METAL CHIP	1K	5%	1/16W
R704	1-216-821-11	METAL CHIP	1K	5%	1/16W
R705	1-216-821-11	METAL CHIP	1K	5%	1/16W
R706	1-216-864-11	METAL CHIP	0	5%	1/16W
R707	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R708	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R709	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R710	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R731	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R732	1-216-818-11	METAL CHIP	560	5%	1/16W
R733	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R734	1-216-835-11	METAL CHIP	15K	5%	1/16W
R735	1-216-857-11	METAL CHIP	1M	5%	1/16W
R736	1-216-821-11	METAL CHIP	1K	5%	1/16W
R737	1-216-821-11	METAL CHIP	1K	5%	1/16W
R738	1-216-838-11	METAL CHIP	27K	5%	1/16W
R739	1-216-843-11	METAL CHIP	68K	5%	1/16W
R740	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R741	1-216-830-11	METAL CHIP	5.6K	5%	1/16W
R742	1-216-820-11	METAL CHIP	820	5%	1/16W
R743	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R744	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R745	1-216-821-11	METAL CHIP	1K	5%	1/16W
R746	1-216-835-11	METAL CHIP	15K	5%	1/16W
R747	1-216-857-11	METAL CHIP	1M	5%	1/16W
R749	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R750	1-216-821-11	METAL CHIP	1K	5%	1/16W
R751	1-216-842-11	METAL CHIP	56K	5%	1/16W
R752	1-216-833-11	METAL CHIP	10K	5%	1/16W
R753	1-216-840-11	METAL CHIP	39K	5%	1/16W
R754	1-216-817-11	METAL CHIP	470	5%	1/16W
R755	1-216-817-11	METAL CHIP	470	5%	1/16W

Ref. No.	Part No.	Description	Remark		
R756	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R757	1-216-821-11	METAL CHIP	1K	5%	1/16W
R758	1-216-814-11	METAL CHIP	270	5%	1/16W
R759	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R760	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R761	1-216-843-11	METAL CHIP	68K	5%	1/16W
R762	1-216-851-11	METAL CHIP	330K	5%	1/16W
R763	1-216-853-11	METAL CHIP	470K	5%	1/16W
R764	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R765	1-216-813-11	METAL CHIP	220	5%	1/16W
R766	1-216-814-11	METAL CHIP	270	5%	1/16W
R767	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R768	1-216-843-11	METAL CHIP	68K	5%	1/16W
R769	1-216-847-11	METAL CHIP	150K	5%	1/16W
R770	1-216-856-11	METAL CHIP	820K	5%	1/16W
R771	1-216-821-11	METAL CHIP	1K	5%	1/16W
R772	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R773	1-216-842-11	METAL CHIP	56K	5%	1/16W
R774	1-216-833-11	METAL CHIP	10K	5%	1/16W
R775	1-216-815-11	METAL CHIP	330	5%	1/16W
R776	1-216-851-11	METAL CHIP	330K	5%	1/16W
R777	1-216-821-11	METAL CHIP	1K	5%	1/16W
R778	1-216-830-11	METAL CHIP	5.6K	5%	1/16W
< VARIABLE RESISTOR >					
RV351	1-238-087-11	RES. ADJ. CERMET 1K			
RV352	1-238-090-11	RES. ADJ. CERMET 10K			
RV401	1-238-091-11	RES. ADJ. CERMET 22K			
RV402	1-238-092-11	RES. ADJ. CERMET 47K			
RV403	1-238-092-11	RES. ADJ. CERMET 47K			
RV404	1-238-089-11	RES. ADJ. CERMET 4.7K			
RV405	1-238-089-11	RES. ADJ. CERMET 4.7K			
RV406	1-238-091-11	RES. ADJ. CERMET 22K			
RV407	1-238-089-11	RES. ADJ. CERMET 4.7K			
RV408	1-238-091-11	RES. ADJ. CERMET 22K			
RV409	1-238-240-11	RES. ADJ. CERMET 220			
RV410	1-238-086-11	RES. ADJ. CERMET 470			
RV411	1-238-086-11	RES. ADJ. CERMET 470			
RV501	1-238-240-11	RES. ADJ. CERMET 220			
RV551	1-238-086-11	RES. ADJ. CERMET 470			
< FLEXIBLE BOARD >					
W101	1-639-618-11	FP-383 FLEXIBLE BOARD			
W301	1-639-623-11	FP-380 FLEXIBLE BOARD			
W401	1-639-615-11	FP-379 FLEXIBLE BOARD			
< VIBRATOR >					
X101	1-579-076-11	VIBRATOR, CRYSTAL (28.375MHz)			
X151	1-567-733-11	VIBRATOR, CRYSTAL (17MHz)			

Ref. No.	Part No.	Description	Remark
X251	1-578-689-21	VIBRATOR, CRYSTAL (8MHz)	
X501	1-577-117-21	OSCILLATOR, CRYSTAL (4.433619MHz)	

* A-7062-393-A VF-40P BOARD, COMPLETE			

(Ref. No 7,000 Series)			
* 3-747-126-01 HOLDER, LED			
< CAPACITOR >			
C951	1-124-442-00	ELECT 330uF 20% 6.3V	
C953	1-163-077-00	CERAMIC CHIP 0.1uF 10% 25V	
C954	1-135-149-21	TANTALUM CHIP 2.2uF 20% 10V	
C955	1-163-037-11	CERAMIC CHIP 0.022uF 10% 25V	
C956	1-131-381-00	TANTALUM 47uF 10% 10V	
C957	1-163-081-00	CERAMIC CHIP 0.22uF 25V	
C958	1-136-718-11	FILM. CHIP 0.1uF 5% 25V	
C959	1-163-109-00	CERAMIC CHIP 47PF 5% 50V	
C960	1-127-515-11	ELECT(SOLID) 47uF 20% 6.3V	
C961	△ 1-163-205-00	CERAMIC CHIP 0.001uF 5% 50V	
C962	△ 1-162-625-11	CERAMIC CHIP 0.0047uF 5% 50V	
C963	△ 1-162-625-11	CERAMIC CHIP 0.0047uF 5% 50V	
C965	1-126-090-11	ELECT 82uF 20% 10V	
C966	1-124-257-00	ELECT 2.2uF 20% 50V	
C968	1-163-037-11	CERAMIC CHIP 0.022uF 10% 25V	
C969	1-164-611-11	CERAMIC CHIP 0.001uF 10% 500V	
< CONNECTOR >			
CN951	* 1-566-759-11	PIN. CONNECTOR (PC BOARD) 4P	
CN952	* 1-566-195-11	PIN. CONNECTOR (PC BOARD) 2P	
CN953	* 1-566-195-11	PIN. CONNECTOR (PC BOARD) 2P	
< DIODE >			
D951	8-719-820-65	DIODE TLS221	
D952	8-719-984-02	LED BR4371F	
D953	8-719-400-20	DIODE MA152WA-TX	
< IC >			
IC951	8-759-420-01	IC AN2512S	
< COIL >			
L951	1-408-976-21	INDUCTOR 33uH	
L952	1-408-785-21	INDUCTOR CHIP 47uH	
L953	△ 1-459-876-41	COIL, FERRITE (HLC)	

Ref. No.	Part No.	Description	Remark
< TRANSISTOR >			
Q953	8-729-216-22	TRANSISTOR 2SA1162	
Q954	8-729-100-67	TRANSISTOR 2SC1623-L7	
Q955	8-729-106-68	TRANSISTOR 2SD1615A-GP	
< RESISTOR >			
R953	1-216-041-00	METAL CHIP 470 5% 1/10W	
R955	1-216-003-11	METAL GLAZE 12 5% 1/10W	
R956	1-216-121-00	METAL CHIP 1M 5% 1/10W	
R957	1-216-033-00	METAL CHIP 220 5% 1/10W	
R958	1-216-097-00	METAL CHIP 100K 5% 1/10W	
R959	1-216-113-00	METAL CHIP 470K 5% 1/10W	
R960	1-216-053-00	METAL CHIP 1.5K 5% 1/10W	
R961	1-216-160-00	METAL GLAZE 27 5% 1/8W	
R962	1-216-336-11	METAL CHIP 47K 1% 1/10W	
R963	1-216-107-00	METAL CHIP 270K 5% 1/10W	
R964	1-216-025-00	METAL CHIP 100 5% 1/10W	
R965	1-216-308-00	METAL CHIP 4.7 5% 1/10W	
R967	1-216-047-00	METAL CHIP 820 5% 1/10W	
R968	1-216-069-00	METAL CHIP 6.8K 5% 1/10W	
R969	1-216-748-11	METAL CHIP 39K 1% 1/10W	
R970	1-216-748-11	METAL CHIP 39K 1% 1/10W	
R972	1-216-101-00	METAL CHIP 150K 5% 1/10W	
R973	1-216-121-00	METAL CHIP 1M 5% 1/10W	
R974	1-216-131-11	METAL CHIP 2.7M 5% 1/10W	
R975	1-216-131-11	METAL CHIP 2.7M 5% 1/10W	
R976	1-216-055-00	METAL CHIP 1.8K 5% 1/10W	
R978	1-216-041-00	METAL CHIP 470 5% 1/10W	
R983	1-216-121-00	METAL CHIP 1M 5% 1/10W	
< VARIABLE RESISTOR >			
RV951	1-238-092-11	RES. ADJ. CERMET 47K	
RV952	1-238-086-11	RES. ADJ. CERMET 470	
RV953	1-238-088-11	RES. ADJ. CERMET 2.2K	
RV954	1-228-762-00	RES. ADJ. METAL GLAZE 1M	
< TRANSFORMER >			
T951	△ 1-439-486-11	TRANSFORMER ASSY, FLYBACK	
< THERMISTOR >			
TH951	1-807-938-11	THERMISTOR	
< SOCKET >			
W951	△ 1-540-019-21	SOCKET ASSY, CRT	

Note: The components identified by mark △ or dotted line with mark △ are critical for safety. Replace only with part number specified.

VS-87

Ref. No.	Part No.	Description	Remark
	A-7062-901-A	VS-87 BOARD, COMPLETE	

		(Ref. No 5, 000 Series)	
	1-630-591-11	FP-182 FLEXIBLE BOARD	
	* 3-942-968-01	CASE (LOWER), SHIELD, RP	
	* 3-942-969-01	CASE (UPPER), SHIELD, RP	
		< CAPACITOR >	
C001	1-162-968-11	CERAMIC CHIP 0.0047uF	10% 50V
C004	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C005	1-135-161-21	TANTALUM CHIP 22uF	10% 10V
C006	1-135-161-21	TANTALUM CHIP 22uF	10% 10V
C007	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C009	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C010	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C011	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V
C012	1-162-921-11	CERAMIC CHIP 33PF	5% 50V
C013	1-164-217-11	CERAMIC CHIP 150PF	0.25PF 50V
C014	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C015	1-162-912-11	CERAMIC CHIP 7PF	0.5PF 50V
C016	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C017	1-162-914-11	CERAMIC CHIP 9PF	0.5PF 50V
C018	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C020	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C021	1-162-915-11	CERAMIC CHIP 10PF	0.5PF 50V
C022	1-135-091-00	TANTALUM CHIP 1uF	20% 16V
C023	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C024	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C025	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C026	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C027	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C028	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C029	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C030	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C031	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C032	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C033	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C034	1-162-912-11	CERAMIC CHIP 7PF	0.5PF 50V
C035	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C036	1-164-217-11	CERAMIC CHIP 150PF	0.25PF 50V
C037	1-162-921-11	CERAMIC CHIP 33PF	5% 50V
C038	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V
C039	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C040	1-162-968-11	CERAMIC CHIP 0.0047uF	10% 50V
C041	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C042	1-162-914-11	CERAMIC CHIP 9PF	0.5PF 50V
C044	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C045	1-135-091-00	TANTALUM CHIP 1uF	20% 16V

Ref. No.	Part No.	Description	Remark
C046	1-162-914-11	CERAMIC CHIP 9PF	0.5PF 50V
C047	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C048	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C049	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C050	1-135-091-00	TANTALUM CHIP 1uF	20% 16V
C051	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V
C052	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C053	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C054	1-162-968-11	CERAMIC CHIP 0.0047uF	10% 50V
C055	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C057	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C058	1-135-161-21	TANTALUM CHIP 22uF	10% 10V
C059	1-135-161-21	TANTALUM CHIP 22uF	10% 10V
C060	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C062	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C063	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V
C064	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C065	1-164-217-11	CERAMIC CHIP 150PF	0.25PF 50V
C066	1-162-921-11	CERAMIC CHIP 33PF	5% 50V
C067	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C068	1-162-912-11	CERAMIC CHIP 7PF	0.5PF 50V
C069	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C070	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C071	1-162-914-11	CERAMIC CHIP 9PF	0.5PF 50V
C073	1-162-914-11	CERAMIC CHIP 9PF	0.5PF 50V
C074	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C075	1-135-091-00	TANTALUM CHIP 1uF	20% 16V
C076	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C077	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C078	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C079	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C080	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C081	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C082	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C083	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C084	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C085	1-164-633-11	CERAMIC CHIP 0.1uF	10% 25V
C086	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C087	1-162-912-11	CERAMIC CHIP 7PF	0.5PF 50V
C088	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C089	1-164-217-11	CERAMIC CHIP 150PF	0.25PF 50V
C090	1-162-921-11	CERAMIC CHIP 33PF	5% 50V
C091	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C092	1-135-157-21	TANTALUM CHIP 10uF	20% 6.3V
C093	1-162-968-11	CERAMIC CHIP 0.0047uF	10% 50V
C094	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C095	1-162-914-11	CERAMIC CHIP 9PF	0.5PF 50V
C097	1-164-360-11	CERAMIC CHIP 0.1uF	16V
C098	1-135-091-00	TANTALUM CHIP 1uF	20% 16V

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
C099	1-162-914-11	CERAMIC CHIP	9PF 0.5PF 50V	C187	1-162-916-11	CERAMIC CHIP	12PF 5% 50V
C100	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C188	1-162-905-11	CERAMIC CHIP	1PF 0.25PF 50V
C101	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V	C189	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C102	1-164-360-11	CERAMIC CHIP	0.1uF 16V	C190	1-162-912-11	CERAMIC CHIP	7PF 0.5PF 50V
C103	1-135-091-00	TANTALUM CHIP	1uF 20% 16V	C191	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C104	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C192	1-162-918-11	CERAMIC CHIP	18PF 5% 50V
C105	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C193	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C106	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C194	1-164-360-11	CERAMIC CHIP	0.1uF 16V
C109	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C195	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C110	1-164-360-11	CERAMIC CHIP	0.1uF 16V	C196	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V
C111	1-162-953-11	CERAMIC CHIP	100PF 5% 50V	C197	1-164-360-11	CERAMIC CHIP	0.1uF 16V
C112	1-162-926-11	CERAMIC CHIP	82PF 5% 50V	C198	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C113	1-162-927-11	CERAMIC CHIP	100PF 5% 50V	C199	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C114	1-164-217-11	CERAMIC CHIP	150PF 0.25PF 50V	C200	1-164-218-11	CERAMIC CHIP	180PF 0.25PF 50V
C151	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C202	1-162-922-11	CERAMIC CHIP	39PF 5% 50V
C152	1-164-360-11	CERAMIC CHIP	0.1uF 16V	C203	1-162-926-11	CERAMIC CHIP	82PF 5% 50V
C153	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V	C204	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C154	1-163-809-11	CERAMIC CHIP	0.047uF 10% 25V	C205	1-162-925-11	CERAMIC CHIP	68PF 5% 50V
C155	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C206	1-164-218-11	CERAMIC CHIP	180PF 0.25PF 50V
C156	1-162-966-11	CERAMIC CHIP	0.0022uF 10% 50V	C208	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C157	1-162-958-11	CERAMIC CHIP	270PF 5% 50V	C209	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C158	1-162-944-11	CERAMIC CHIP	18PF 5% 50V	C210	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C159	1-162-948-11	CERAMIC CHIP	39PF 5% 50V	C211	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C160	1-162-947-11	CERAMIC CHIP	33PF 5% 50V	C212	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C161	1-162-941-11	CERAMIC CHIP	10PF 0.5PF 50V	C213	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C162	1-162-910-11	CERAMIC CHIP	5PF 0.25PF 50V	C214	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C163	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V	C215	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C164	1-164-360-11	CERAMIC CHIP	0.1uF 16V	C216	1-164-360-11	CERAMIC CHIP	0.1uF 16V
C166	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C217	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V
C167	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C218	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C168	1-162-910-11	CERAMIC CHIP	5PF 0.25PF 50V	C219	1-164-360-11	CERAMIC CHIP	0.1uF 16V
C169	1-162-915-11	CERAMIC CHIP	10PF 0.5PF 50V	C220	1-162-976-11	CERAMIC CHIP	75PF 5% 50V
C170	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C240	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V
C171	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C301	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V
C172	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C302	1-162-974-11	CERAMIC CHIP	0.01uF 50V
C173	1-162-919-11	CERAMIC CHIP	22PF 5% 50V	C303	1-164-005-11	CERAMIC CHIP	0.47uF 25V
C174	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C304	1-162-944-11	CERAMIC CHIP	18PF 5% 50V
C175	1-162-947-11	CERAMIC CHIP	33PF 5% 50V	C305	1-164-634-11	CERAMIC CHIP	1uF 16V
C176	1-162-915-11	CERAMIC CHIP	10PF 0.5PF 50V	C307	1-164-005-11	CERAMIC CHIP	0.47uF 25V
C177	1-162-912-11	CERAMIC CHIP	7PF 0.5PF 50V	C308	1-162-971-11	CERAMIC CHIP	0.001uF 50V
C178	1-162-915-11	CERAMIC CHIP	10PF 0.5PF 50V	C309	1-164-360-11	CERAMIC CHIP	0.1uF 16V
C179	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V	C310	1-162-974-11	CERAMIC CHIP	0.01uF 50V
C180	1-164-360-11	CERAMIC CHIP	0.1uF 16V	C311	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V
C181	1-162-919-11	CERAMIC CHIP	22PF 5% 50V	C312	1-135-149-21	TANTALUM CHIP	2.2uF 20% 10V
C182	1-162-920-11	CERAMIC CHIP	27PF 5% 50V	C313	1-126-246-11	ELECT CHIP	220uF 20% 4V
C183	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C314	1-162-971-11	CERAMIC CHIP	0.001uF 50V
C184	1-163-809-11	CERAMIC CHIP	0.047uF 10% 25V	C315	1-162-971-11	CERAMIC CHIP	0.001uF 50V
C185	1-163-809-11	CERAMIC CHIP	0.047uF 10% 25V	C316	1-164-005-11	CERAMIC CHIP	0.47uF 25V
C186	1-164-227-11	CERAMIC CHIP	0.022uF 10% 25V				

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
C317	1-162-974-11	CERAMIC CHIP	0.01uF 50V	C646	1-135-091-00	TANTALUM CHIP	1uF 20% 16V
C318	1-162-974-11	CERAMIC CHIP	0.01uF 50V	C647	1-164-633-11	CERAMIC CHIP	0.1uF 10% 25V
C319	1-162-974-11	CERAMIC CHIP	0.01uF 50V	C648	1-135-180-21	TANTALUM CHIP	3.3uF 20% 6.3V
C320	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V	C649	1-164-157-11	CERAMIC CHIP	0.068uF 10% 25V
				C650	1-164-157-11	CERAMIC CHIP	0.068uF 10% 25V
C321	1-162-974-11	CERAMIC CHIP	0.01uF 50V	C651	1-164-634-11	CERAMIC CHIP	1uF 16V
C322	1-164-360-11	CERAMIC CHIP	0.1uF 16V	C652	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C601	1-162-638-11	CERAMIC CHIP	1uF 16V	C653	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C602	1-162-638-11	CERAMIC CHIP	1uF 16V	C654	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C603	1-162-911-11	CERAMIC CHIP	6PF 0.5PF 50V	C655	1-162-967-11	CERAMIC CHIP	0.0033uF 10% 50V
C604	1-162-916-11	CERAMIC CHIP	12PF 5% 50V	C656	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C605	1-164-360-11	CERAMIC CHIP	0.1uF 16V	C657	1-164-633-11	CERAMIC CHIP	0.1uF 10% 25V
C606	1-162-969-11	CERAMIC CHIP	0.0068uF 10% 25V	C658	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C607	1-162-969-11	CERAMIC CHIP	0.0068uF 10% 25V	C659	1-164-633-11	CERAMIC CHIP	0.1uF 10% 25V
C608	1-162-974-11	CERAMIC CHIP	0.01uF 50V	C660	1-163-809-11	CERAMIC CHIP	0.047uF 10% 25V
C609	1-162-638-11	CERAMIC CHIP	1uF 16V	C661	1-163-809-11	CERAMIC CHIP	0.047uF 10% 25V
C610	1-162-974-11	CERAMIC CHIP	0.01uF 50V	C662	1-164-634-11	CERAMIC CHIP	1uF 16V
C611	1-162-974-11	CERAMIC CHIP	0.01uF 50V	C663	1-164-634-11	CERAMIC CHIP	1uF 16V
C612	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V	C664	1-163-809-11	CERAMIC CHIP	0.047uF 10% 25V
C613	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V	C665	1-135-092-21	TANTALUM CHIP	3.3uF 10% 16V
C614	1-162-974-11	CERAMIC CHIP	0.01uF 50V	C666	1-162-974-11	CERAMIC CHIP	0.01uF 50V
C615	1-164-227-11	CERAMIC CHIP	0.022uF 10% 25V	C667	1-164-360-11	CERAMIC CHIP	0.1uF 16V
C616	1-164-227-11	CERAMIC CHIP	0.022uF 10% 25V	C668	1-164-360-11	CERAMIC CHIP	0.1uF 16V
C617	1-162-995-11	CERAMIC CHIP	0.022uF 50V	C669	1-162-995-11	CERAMIC CHIP	0.022uF 50V
C618	1-164-173-11	CERAMIC CHIP	0.0039uF 10% 50V	C670	1-162-968-11	CERAMIC CHIP	0.0047uF 10% 50V
C619	1-162-638-11	CERAMIC CHIP	1uF 16V	C671	1-162-995-11	CERAMIC CHIP	0.022uF 50V
C620	1-164-634-11	CERAMIC CHIP	1uF 16V	C672	1-162-995-11	CERAMIC CHIP	0.022uF 50V
C621	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V	C673	1-164-633-11	CERAMIC CHIP	0.1uF 10% 25V
C622	1-164-360-11	CERAMIC CHIP	0.1uF 16V	C674	1-135-180-21	TANTALUM CHIP	3.3uF 20% 6.3V
C623	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V	C675	1-162-638-11	CERAMIC CHIP	1uF 16V
C624	1-162-638-11	CERAMIC CHIP	1uF 16V	C676	1-162-915-11	CERAMIC CHIP	10PF 0.5PF 50V
C625	1-164-222-11	CERAMIC CHIP	0.22uF 25V	C677	1-162-919-11	CERAMIC CHIP	22PF 5% 50V
C626	1-162-974-11	CERAMIC CHIP	0.01uF 50V	C678	1-162-921-11	CERAMIC CHIP	33PF 5% 50V
C627	1-164-227-11	CERAMIC CHIP	0.022uF 10% 25V	C679	1-162-918-11	CERAMIC CHIP	18PF 5% 50V
C628	1-163-809-11	CERAMIC CHIP	0.047uF 10% 25V	C680	1-135-180-21	TANTALUM CHIP	3.3uF 20% 6.3V
C629	1-164-227-11	CERAMIC CHIP	0.022uF 10% 25V	C681	1-162-638-11	CERAMIC CHIP	1uF 16V
C630	1-162-974-11	CERAMIC CHIP	0.01uF 50V	C682	1-164-360-11	CERAMIC CHIP	0.1uF 16V
C631	1-162-965-11	CERAMIC CHIP	0.0015uF 10% 50V	C683	1-164-222-11	CERAMIC CHIP	0.22uF 25V
C633	1-162-974-11	CERAMIC CHIP	0.01uF 50V	C686	1-164-360-11	CERAMIC CHIP	0.1uF 16V
C634	1-162-638-11	CERAMIC CHIP	1uF 16V	C688	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V
C635	1-162-638-11	CERAMIC CHIP	1uF 16V	C689	1-163-809-11	CERAMIC CHIP	0.047uF 10% 25V
C636	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C690	1-135-211-11	TANTAL. CHIP	6.8uF 20% 6.3V
C637	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C692	1-162-964-11	CERAMIC CHIP	0.001uF 10% 50V
C638	1-135-157-21	TANTALUM CHIP	10uF 20% 6.3V	C693	1-162-965-11	CERAMIC CHIP	0.0015uF 10% 50V
C639	1-162-970-11	CERAMIC CHIP	0.01uF 10% 25V	C695	1-164-633-11	CERAMIC CHIP	0.1uF 10% 25V
C641	1-163-809-11	CERAMIC CHIP	0.047uF 10% 25V	C696	1-135-181-21	TANTALUM CHIP	4.7uF 20% 6.3V
C642	1-162-968-11	CERAMIC CHIP	0.0047uF 10% 50V				
C643	1-135-091-00	TANTALUM CHIP	1uF 20% 16V				
C644	1-163-077-00	CERAMIC CHIP	0.1uF 10% 25V				
C645	1-163-077-00	CERAMIC CHIP	0.1uF 10% 25V				

Ref. No.	Part No.	Description	Remark
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< CONNECTOR >

CN001	1-566-531-11	CONNECTOR, FPC (ZIF) 15P	
CN002	1-580-265-61	CONNECTOR, BOARD TO BOARD 16P	
CN301	* 1-565-876-11	PIN, CONNECTOR (PC BOARD) 4P	
CN302	1-580-269-61	CONNECTOR, BOARD TO BOARD 24P	
CN303	1-566-530-11	CONNECTOR, FPC (ZIF) 14P	
CN304	1-580-247-41	CONNECTOR, BOARD TO BOARD 18P	
CN305	1-580-249-41	CONNECTOR, BOARD TO BOARD 24P	
CN502	1-565-662-11	CONNECTOR (PC BOARD) 15P	
CN601	1-566-538-11	CONNECTOR, FPC (NON ZIF) 6P	
CN602	1-569-363-21	CONNECTOR, FPC 15P	
CN603	1-565-527-11	PIN, CONNECTOR (PC BOARD) 2P	
CN604	1-566-541-11	CONNECTOR, FPC (NON ZIF) 9P	
CN606	1-580-263-41	CONNECTOR, BOARD TO BOARD 12P	
CN609	1-580-248-41	CONNECTOR, BOARD TO BOARD 20P	
CN610	1-580-086-41	CONNECTOR, BOARD TO BOARD 22P	

< DIODE >

D001	8-719-404-46	DIODE	MA110
D002	8-719-404-46	DIODE	MA110
D003	8-719-404-46	DIODE	MA110
D004	8-719-404-46	DIODE	MA110
D151	8-719-404-46	DIODE	MA110
D152	8-719-800-76	DIODE	1SS226
D153	8-719-800-76	DIODE	1SS226
D154	8-719-404-46	DIODE	MA110
D155	8-719-404-46	DIODE	MA110
D156	8-719-800-76	DIODE	1SS226
D157	8-719-404-46	DIODE	MA110
D301	8-719-404-35	DIODE	MA141WK
D302	8-719-404-46	DIODE	MA110
D303	8-719-420-14	DIODE	MA8082-M
D304	8-719-404-46	DIODE	MA110
D305	8-719-404-46	DIODE	MA110
D306	8-719-420-14	DIODE	MA8082-M
D307	8-719-420-14	DIODE	MA8082-M
D308	8-719-420-14	DIODE	MA8082-M
D309	8-719-420-14	DIODE	MA8082-M
D601	△ 8-719-421-27	DIODE	MA728

< FILTER >

FL151	1-409-475-21	FILTER, TRAP
FL301	1-415-818-11	DELAY LINE, LC (Y)

< IC >

IC001	8-752-033-00	IC	CXA1234AR
IC002	8-752-033-00	IC	CXA1234AR
IC151	8-759-998-32	IC	CXD-2107M

Ref. No.	Part No.	Description	Remark
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IC152	8-759-925-60	IC	BA401
IC153	8-759-509-05	IC	XRU4066BF
IC301	8-759-038-83	IC	MC13400FUEB
IC302	8-759-521-09	IC	MB88346APFV
IC601	8-752-833-59	IC	CXP80624-245Q
IC602	8-759-044-07	IC	uPD75304GF-210-3B9
IC603	8-759-512-42	IC	CXA1481R
IC604	8-759-823-90	IC	LB8110M
IC605	8-759-823-65	IC	MCD002AM
IC606	8-759-057-60	IC	MCD004BM
IC607	8-759-038-98	IC	MPC1726MR2
IC608	△ 8-759-511-22	IC	CXA1448N
IC609	8-759-999-02	IC	TL1596CDB
IC610	8-759-512-69	IC	S-81350HG-KD
IC611	8-759-243-19	IC	TC7SU04F

< COIL >

L001	1-412-033-11	INDUCTOR CHIP	220uH
L002	1-410-385-11	INDUCTOR CHIP	22uH
L003	1-410-383-31	INDUCTOR CHIP	15uH
L004	1-412-032-11	INDUCTOR CHIP	100uH
L005	1-412-032-11	INDUCTOR CHIP	100uH
L006	1-410-384-31	INDUCTOR CHIP	18uH
L007	1-412-033-11	INDUCTOR CHIP	220uH
L008	1-410-385-11	INDUCTOR CHIP	22uH
L009	1-410-384-31	INDUCTOR CHIP	18uH
L010	1-412-032-11	INDUCTOR CHIP	100uH
L011	1-410-384-31	INDUCTOR CHIP	18uH
L012	1-410-381-11	INDUCTOR CHIP	10uH
L013	1-410-381-11	INDUCTOR CHIP	10uH
L014	1-412-033-11	INDUCTOR CHIP	220uH
L015	1-410-381-11	INDUCTOR CHIP	10uH
L016	1-412-032-11	INDUCTOR CHIP	100uH
L151	1-410-381-11	INDUCTOR CHIP	10uH
L152	1-410-657-21	INDUCTOR CHIP	180uH
L153	1-408-797-11	INDUCTOR CHIP	470uH
L154	1-410-388-21	INDUCTOR CHIP	39uH
L155	1-410-382-31	INDUCTOR CHIP	12uH
L156	1-410-381-11	INDUCTOR CHIP	10uH
L157	1-410-381-11	INDUCTOR CHIP	10uH
L158	1-410-657-21	INDUCTOR CHIP	180uH
L159	1-410-387-11	INDUCTOR CHIP	33uH
L160	1-410-381-11	INDUCTOR CHIP	10uH
L161	1-410-384-31	INDUCTOR CHIP	18uH
L162	1-408-797-11	INDUCTOR CHIP	470uH
L163	1-408-797-11	INDUCTOR CHIP	470uH
L164	1-410-384-31	INDUCTOR CHIP	18uH
L165	1-412-280-31	INDUCTOR	330uH

Note: The components identified by mark △ or dotted line with mark △ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
L166	1-410-658-31	INDUCTOR CHIP 220uH		Q155	8-729-140-63	TRANSISTOR 2SA1611-M5M6	
L167	1-410-656-11	INDUCTOR CHIP 150uH		Q157	8-729-905-18	TRANSISTOR DTC144EU	
L168	1-410-655-31	INDUCTOR CHIP 120uH		Q158	8-729-905-35	TRANSISTOR 2SC4081-R	
L169	1-410-381-11	INDUCTOR CHIP 10uH		Q159	8-729-905-18	TRANSISTOR DTC144EU	
				Q160	8-729-904-20	TRANSISTOR FMA2	
L170	1-410-381-11	INDUCTOR CHIP 10uH					
L171	1-412-280-31	INDUCTOR 330uH		Q161	8-729-904-07	TRANSISTOR FMG2	
L172	1-410-379-31	INDUCTOR CHIP 6.8uH		Q162	8-729-904-20	TRANSISTOR FMA2	
L301	1-412-029-11	INDUCTOR CHIP 10uH		Q163	8-729-904-07	TRANSISTOR FMG2	
L302	1-412-029-11	INDUCTOR CHIP 10uH		Q165	8-729-823-16	TRANSISTOR 2SC4555-5. 6. 7	
				Q166	8-729-905-18	TRANSISTOR DTC144EU	
L303	1-410-389-31	INDUCTOR CHIP 47uH					
L304	1-410-369-11	INDUCTOR CHIP 1uH		Q167	8-729-905-35	TRANSISTOR 2SC4081-R	
L306	1-412-029-11	INDUCTOR CHIP 10uH		Q168	8-729-423-52	TRANSISTOR 2SC3931	
L601	1-412-031-11	INDUCTOR CHIP 47uH		Q169	8-729-905-12	TRANSISTOR DTA144EU	
L602	1-410-369-11	INDUCTOR CHIP 1uH		Q170	8-729-905-35	TRANSISTOR 2SC4081-R	
				Q171	8-729-905-18	TRANSISTOR DTC144EU	
L603	1-412-032-11	INDUCTOR CHIP 100uH					
L604	1-412-280-31	INDUCTOR 330uH		Q172	8-729-905-18	TRANSISTOR DTC144EU	
L605	1-410-389-31	INDUCTOR CHIP 47uH		Q173	8-729-905-18	TRANSISTOR DTC144EU	
L606	1-412-031-11	INDUCTOR CHIP 47uH		Q174	8-729-905-35	TRANSISTOR 2SC4081-R	
				Q175	8-729-905-35	TRANSISTOR 2SC4081-R	
				Q176	8-729-602-21	TRANSISTOR 2SC4154	
				Q176	8-729-905-35	TRANSISTOR 2SC4081-R	
				Q177	8-729-903-10	TRANSISTOR FMW1	
				Q178	8-729-140-63	TRANSISTOR 2SA1611-M5M6	
				Q179	8-729-905-18	TRANSISTOR DTC144EU	
				Q180	8-729-140-63	TRANSISTOR 2SA1611-M5M6	
				Q181	8-729-140-63	TRANSISTOR 2SA1611-M5M6	
				Q182	8-729-905-18	TRANSISTOR DTC144EU	
				Q183	8-729-905-35	TRANSISTOR 2SC4081-R	
				Q186	8-729-905-35	TRANSISTOR 2SC4081-R	
				Q187	8-729-905-18	TRANSISTOR DTC144EU	
				Q189	8-729-903-10	TRANSISTOR FMW1	
				Q192	8-729-905-18	TRANSISTOR DTC144EU	
				Q193	8-729-904-20	TRANSISTOR FMA2	
				Q194	8-729-905-12	TRANSISTOR DTA144EU	
				Q195	8-729-905-35	TRANSISTOR 2SC4081-R	
				Q196	8-729-905-18	TRANSISTOR DTC144EU	
				Q197	8-729-905-35	TRANSISTOR 2SC4081-R	
				Q198	8-729-140-63	TRANSISTOR 2SA1611-M5M6	
				Q199	8-729-905-18	TRANSISTOR DTC144EU	
				Q200	8-729-905-18	TRANSISTOR DTC144EU	
				Q201	8-729-905-35	TRANSISTOR 2SC4081-R	
				Q202	8-729-905-35	TRANSISTOR 2SC4081-R	
				Q301	8-729-905-96	TRANSISTOR DTA114TU	
				Q302	8-729-905-18	TRANSISTOR DTC144EU	
				Q303	8-729-904-07	TRANSISTOR FMG2	
				Q304	8-729-423-52	TRANSISTOR 2SC3931	
				Q305	8-729-421-23	TRANSISTOR XN1216	
				Q306	8-729-423-52	TRANSISTOR 2SC3931	
				Q307	8-729-402-78	TRANSISTOR XN6401	

< IC LINK >

PS601 Δ 1-532-605-00 LINK, IC ICP-F10 (0.4A)PS602 Δ 1-532-685-00 LINK, IC ICP-F20 (0.8A)

< TRANSISTOR >

Q001	8-729-140-63	TRANSISTOR 2SA1611-M5M6
Q002	8-729-423-52	TRANSISTOR 2SC3931
Q003	8-729-905-18	TRANSISTOR DTC144EU
Q004	8-729-824-02	TRANSISTOR 2SA1838
Q005	8-729-824-02	TRANSISTOR 2SA1838
Q006	8-729-423-52	TRANSISTOR 2SC3931
Q007	8-729-905-18	TRANSISTOR DTC144EU
Q008	8-729-140-63	TRANSISTOR 2SA1611-M5M6
Q009	8-729-905-18	TRANSISTOR DTC144EU
Q010	8-729-140-63	TRANSISTOR 2SA1611-M5M6
Q011	8-729-423-52	TRANSISTOR 2SC3931
Q012	8-729-905-18	TRANSISTOR DTC144EU
Q013	8-729-824-02	TRANSISTOR 2SA1838
Q014	8-729-824-02	TRANSISTOR 2SA1838
Q015	8-729-423-52	TRANSISTOR 2SC3931
Q016	8-729-905-18	TRANSISTOR DTC144EU
Q017	8-729-140-63	TRANSISTOR 2SA1611-M5M6
Q018	8-729-905-18	TRANSISTOR DTC144EU
Q019	8-729-140-63	TRANSISTOR 2SA1611-M5M6
Q020	8-729-140-63	TRANSISTOR 2SA1611-M5M6
Q021	8-729-216-22	TRANSISTOR 2SA1162
Q151	8-729-423-52	TRANSISTOR 2SC3931
Q152	8-729-905-35	TRANSISTOR 2SC4081-R
Q153	8-729-905-35	TRANSISTOR 2SC4081-R
Q154	8-729-423-52	TRANSISTOR 2SC3931

Note: The components identified by mark Δ or dotted line with mark Δ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description	Remark
Q308	8-729-824-05	TRANSISTOR 3SK248	
Q309	8-729-824-05	TRANSISTOR 3SK248	
Q310	8-729-905-35	TRANSISTOR 2SC4081-R	
Q311	8-729-921-58	TRANSISTOR DTA144TU	
Q312	8-729-905-18	TRANSISTOR DTC144EU	
Q313	8-729-402-78	TRANSISTOR XN6401	
Q314	8-729-106-60	TRANSISTOR 2SB1115A	
Q315	8-729-905-23	TRANSISTOR 2SA1576-R	
Q318	8-729-905-35	TRANSISTOR 2SC4081-R	
Q601	8-729-907-00	TRANSISTOR DTC114EU	

< RESISTOR >

R001	1-216-841-11	METAL CHIP	47K	5%	1/16W
R002	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R003	1-216-841-11	METAL CHIP	47K	5%	1/16W
R004	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R005	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R008	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R009	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R010	1-216-812-11	METAL CHIP	180	5%	1/16W
R011	1-216-797-11	METAL CHIP	10	5%	1/16W
R012	1-216-837-11	METAL CHIP	22K	5%	1/16W
R013	1-216-833-11	METAL CHIP	10K	5%	1/16W
R014	1-216-838-11	METAL CHIP	27K	5%	1/16W
R015	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R016	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
R017	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
R019	1-216-837-11	METAL CHIP	22K	5%	1/16W
R020	1-216-839-11	METAL CHIP	33K	5%	1/16W
R021	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R022	1-216-833-11	METAL CHIP	10K	5%	1/16W
R023	1-216-840-11	METAL CHIP	39K	5%	1/16W
R024	1-216-840-11	METAL CHIP	39K	5%	1/16W
R025	1-216-840-11	METAL CHIP	39K	5%	1/16W
R026	1-216-840-11	METAL CHIP	39K	5%	1/16W
R027	1-216-821-11	METAL CHIP	1K	5%	1/16W
R028	1-216-838-11	METAL CHIP	27K	5%	1/16W
R029	1-216-837-11	METAL CHIP	22K	5%	1/16W
R030	1-216-833-11	METAL CHIP	10K	5%	1/16W
R031	1-216-812-11	METAL CHIP	180	5%	1/16W
R032	1-216-797-11	METAL CHIP	10	5%	1/16W
R033	1-216-841-11	METAL CHIP	47K	5%	1/16W
R034	1-216-841-11	METAL CHIP	47K	5%	1/16W
R035	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R036	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
R037	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
R039	1-216-837-11	METAL CHIP	22K	5%	1/16W
R040	1-216-839-11	METAL CHIP	33K	5%	1/16W
R041	1-216-825-11	METAL CHIP	2.2K	5%	1/16W

Ref. No.	Part No.	Description	Remark
R042	1-216-841-11	METAL CHIP	47K 5% 1/16W
R043	1-216-827-11	METAL CHIP	3.3K 5% 1/16W
R044	1-216-841-11	METAL CHIP	47K 5% 1/16W
R045	1-216-829-11	METAL CHIP	4.7K 5% 1/16W
R046	1-216-825-11	METAL CHIP	2.2K 5% 1/16W
R047	1-216-825-11	METAL CHIP	2.2K 5% 1/16W
R050	1-216-829-11	METAL CHIP	4.7K 5% 1/16W
R051	1-216-797-11	METAL CHIP	10 5% 1/16W
R052	1-216-812-11	METAL CHIP	180 5% 1/16W
R053	1-216-837-11	METAL CHIP	22K 5% 1/16W
R054	1-216-833-11	METAL CHIP	10K 5% 1/16W
R055	1-216-838-11	METAL CHIP	27K 5% 1/16W
R056	1-216-821-11	METAL CHIP	1K 5% 1/16W
R057	1-216-824-11	METAL CHIP	1.8K 5% 1/16W
R058	1-216-824-11	METAL CHIP	1.8K 5% 1/16W
R060	1-216-837-11	METAL CHIP	22K 5% 1/16W
R061	1-216-839-11	METAL CHIP	33K 5% 1/16W
R062	1-216-825-11	METAL CHIP	2.2K 5% 1/16W
R063	1-216-833-11	METAL CHIP	10K 5% 1/16W
R064	1-216-840-11	METAL CHIP	39K 5% 1/16W
R065	1-216-840-11	METAL CHIP	39K 5% 1/16W
R066	1-216-840-11	METAL CHIP	39K 5% 1/16W
R067	1-216-840-11	METAL CHIP	39K 5% 1/16W
R068	1-216-821-11	METAL CHIP	1K 5% 1/16W
R069	1-216-838-11	METAL CHIP	27K 5% 1/16W
R070	1-216-837-11	METAL CHIP	22K 5% 1/16W
R071	1-216-833-11	METAL CHIP	10K 5% 1/16W
R072	1-216-797-11	METAL CHIP	10 5% 1/16W
R073	1-216-812-11	METAL CHIP	180 5% 1/16W
R074	1-216-841-11	METAL CHIP	47K 5% 1/16W
R075	1-216-827-11	METAL CHIP	3.3K 5% 1/16W
R076	1-216-841-11	METAL CHIP	47K 5% 1/16W
R077	1-216-824-11	METAL CHIP	1.8K 5% 1/16W
R078	1-216-824-11	METAL CHIP	1.8K 5% 1/16W
R080	1-216-837-11	METAL CHIP	22K 5% 1/16W
R081	1-216-839-11	METAL CHIP	33K 5% 1/16W
R082	1-216-825-11	METAL CHIP	2.2K 5% 1/16W
R089	1-216-837-11	METAL CHIP	22K 5% 1/16W
R090	1-216-839-11	METAL CHIP	33K 5% 1/16W
R091	1-216-814-11	METAL CHIP	270 5% 1/16W
R092	1-216-813-11	METAL CHIP	220 5% 1/16W
R093	1-216-829-11	METAL CHIP	4.7K 5% 1/16W
R094	1-216-825-11	METAL CHIP	2.2K 5% 1/16W
R095	1-216-805-11	METAL CHIP	47 5% 1/16W
R096	1-216-805-11	METAL CHIP	47 5% 1/16W
R097	1-216-818-11	METAL CHIP	560 5% 1/16W
R098	1-216-841-11	METAL CHIP	47K 5% 1/16W
R099	1-216-841-11	METAL CHIP	47K 5% 1/16W

Ref. No.	Part No.	Description	Remark			Ref. No.	Part No.	Description	Remark		
R100	1-216-828-11	METAL CHIP	3.9K	5%	1/16W	R200	1-216-864-11	METAL CHIP	0	5%	1/16W
R151	1-216-839-11	METAL CHIP	33K	5%	1/16W	R201	1-216-826-11	METAL CHIP	2.7K	5%	1/16W
R152	1-216-818-11	METAL CHIP	560	5%	1/16W	R202	1-216-839-11	METAL CHIP	33K	5%	1/16W
R153	1-216-835-11	METAL CHIP	15K	5%	1/16W	R203	1-216-837-11	METAL CHIP	22K	5%	1/16W
R154	1-216-816-11	METAL CHIP	390	5%	1/16W	R204	1-216-815-11	METAL CHIP	330	5%	1/16W
R155	1-216-819-11	METAL CHIP	680	5%	1/16W	R205	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R156	1-216-837-11	METAL CHIP	22K	5%	1/16W	R206	1-216-817-11	METAL CHIP	470	5%	1/16W
R157	1-216-837-11	METAL CHIP	22K	5%	1/16W	R207	1-216-808-11	METAL CHIP	82	5%	1/16W
R158	1-216-813-11	METAL CHIP	220	5%	1/16W	R208	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R159	1-216-818-11	METAL CHIP	560	5%	1/16W	R209	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
R160	1-216-821-11	METAL CHIP	1K	5%	1/16W	R210	1-216-830-11	METAL CHIP	5.6K	5%	1/16W
R161	1-216-820-11	METAL CHIP	820	5%	1/16W	R211	1-216-822-11	METAL CHIP	1.2K	5%	1/16W
R162	1-216-817-11	METAL CHIP	470	5%	1/16W	R212	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
R163	1-216-817-11	METAL CHIP	470	5%	1/16W	R213	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
R164	1-216-821-11	METAL CHIP	1K	5%	1/16W	R214	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R165	1-216-821-11	METAL CHIP	1K	5%	1/16W	R215	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R166	1-216-821-11	METAL CHIP	1K	5%	1/16W	R216	1-216-864-11	METAL CHIP	0	5%	1/16W
R167	1-216-815-11	METAL CHIP	330	5%	1/16W	R217	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
R168	1-216-841-11	METAL CHIP	47K	5%	1/16W	R218	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R169	1-216-828-11	METAL CHIP	3.9K	5%	1/16W	R220	1-216-864-11	METAL CHIP	0	5%	1/16W
R170	1-216-825-11	METAL CHIP	2.2K	5%	1/16W	R221	1-216-833-11	METAL CHIP	10K	5%	1/16W
R171	1-216-820-11	METAL CHIP	820	5%	1/16W	R222	1-216-833-11	METAL CHIP	10K	5%	1/16W
R172	1-216-811-11	METAL CHIP	150	5%	1/16W	R223	1-216-833-11	METAL CHIP	10K	5%	1/16W
R173	1-216-833-11	METAL CHIP	10K	5%	1/16W	R224	1-216-837-11	METAL CHIP	22K	5%	1/16W
R174	1-216-833-11	METAL CHIP	10K	5%	1/16W	R225	1-216-814-11	METAL CHIP	270	5%	1/16W
R175	1-216-833-11	METAL CHIP	10K	5%	1/16W	R226	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R176	1-216-821-11	METAL CHIP	1K	5%	1/16W	R227	1-216-817-11	METAL CHIP	470	5%	1/16W
R177	1-216-837-11	METAL CHIP	22K	5%	1/16W	R229	1-216-813-11	METAL CHIP	220	5%	1/16W
R178	1-216-837-11	METAL CHIP	22K	5%	1/16W	R230	1-216-815-11	METAL CHIP	330	5%	1/16W
R179	1-216-809-11	METAL CHIP	100	5%	1/16W	R231	1-216-833-11	METAL CHIP	10K	5%	1/16W
R180	1-216-813-11	METAL CHIP	220	5%	1/16W	R232	1-216-833-11	METAL CHIP	10K	5%	1/16W
R181	1-216-835-11	METAL CHIP	15K	5%	1/16W	R233	1-216-816-11	METAL CHIP	390	5%	1/16W
R182	1-216-817-11	METAL CHIP	470	5%	1/16W	R234	1-216-808-11	METAL CHIP	82	5%	1/16W
R184	1-216-831-11	METAL CHIP	6.8K	5%	1/16W	R235	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R185	1-216-827-11	METAL CHIP	3.3K	5%	1/16W	R236	1-216-837-11	METAL CHIP	22K	5%	1/16W
R186	1-216-822-11	METAL CHIP	1.2K	5%	1/16W	R237	1-216-837-11	METAL CHIP	22K	5%	1/16W
R187	1-216-837-11	METAL CHIP	22K	5%	1/16W	R239	1-216-838-11	METAL CHIP	27K	5%	1/16W
R188	1-216-837-11	METAL CHIP	22K	5%	1/16W	R240	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R189	1-216-818-11	METAL CHIP	560	5%	1/16W	R241	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R190	1-216-815-11	METAL CHIP	330	5%	1/16W	R243	1-216-818-11	METAL CHIP	560	5%	1/16W
R191	1-216-820-11	METAL CHIP	820	5%	1/16W	R244	1-216-817-11	METAL CHIP	470	5%	1/16W
R192	1-216-837-11	METAL CHIP	22K	5%	1/16W	R245	1-216-837-11	METAL CHIP	22K	5%	1/16W
R193	1-216-837-11	METAL CHIP	22K	5%	1/16W	R246	1-216-833-11	METAL CHIP	10K	5%	1/16W
R194	1-216-821-11	METAL CHIP	1K	5%	1/16W	R247	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R195	1-216-838-11	METAL CHIP	27K	5%	1/16W	R248	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R196	1-216-831-11	METAL CHIP	6.8K	5%	1/16W	R249	1-216-821-11	METAL CHIP	1K	5%	1/16W
R197	1-216-816-11	METAL CHIP	390	5%	1/16W	R250	1-216-828-11	METAL CHIP	3.9K	5%	1/16W
R198	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R251	1-216-835-11	METAL CHIP	15K	5%	1/16W
R199	1-216-829-11	METAL CHIP	4.7K	5%	1/16W	R252	1-216-833-11	METAL CHIP	10K	5%	1/16W

Ref. No.	Part No.	Description	Remark		
R253	1-216-820-11	METAL CHIP	820	5%	1/16W
R254	1-216-820-11	METAL CHIP	820	5%	1/16W
R255	1-216-819-11	METAL CHIP	680	5%	1/16W
R256	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R257	1-216-835-11	METAL CHIP	15K	5%	1/16W
R258	1-216-821-11	METAL CHIP	1K	5%	1/16W
R259	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R260	1-216-833-11	METAL CHIP	10K	5%	1/16W
R261	1-216-839-11	METAL CHIP	33K	5%	1/16W
R262	1-216-839-11	METAL CHIP	33K	5%	1/16W
R265	1-216-815-11	METAL CHIP	330	5%	1/16W
R267	1-216-837-11	METAL CHIP	22K	5%	1/16W
R268	1-216-837-11	METAL CHIP	22K	5%	1/16W
R269	1-216-839-11	METAL CHIP	33K	5%	1/16W
R270	1-216-837-11	METAL CHIP	22K	5%	1/16W
R271	1-216-837-11	METAL CHIP	22K	5%	1/16W
R272	1-216-839-11	METAL CHIP	33K	5%	1/16W
R273	1-216-837-11	METAL CHIP	22K	5%	1/16W
R274	1-216-837-11	METAL CHIP	22K	5%	1/16W
R275	1-216-839-11	METAL CHIP	33K	5%	1/16W
R276	1-216-817-11	METAL CHIP	470	5%	1/16W
R277	1-216-826-11	METAL CHIP	2.7K	5%	1/16W
R278	1-216-832-11	METAL CHIP	8.2K	5%	1/16W
R279	1-216-833-11	METAL CHIP	10K	5%	1/16W
R280	1-216-817-11	METAL CHIP	470	5%	1/16W
R281	1-216-817-11	METAL CHIP	470	5%	1/16W
R301	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R302	1-216-839-11	METAL CHIP	33K	5%	1/16W
R303	1-216-839-11	METAL CHIP	33K	5%	1/16W
R304	1-216-821-11	METAL CHIP	1K	5%	1/16W
R305	1-216-821-11	METAL CHIP	1K	5%	1/16W
R306	1-216-828-11	METAL CHIP	3.9K	5%	1/16W
R307	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R308	1-216-833-11	METAL CHIP	10K	5%	1/16W
R309	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R310	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R311	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R312	1-216-821-11	METAL CHIP	1K	5%	1/16W
R313	1-216-821-11	METAL CHIP	1K	5%	1/16W
R314	1-216-817-11	METAL CHIP	470	5%	1/16W
R315	1-216-826-11	METAL CHIP	2.7K	5%	1/16W
R316	1-216-821-11	METAL CHIP	1K	5%	1/16W
R317	1-216-820-11	METAL CHIP	820	5%	1/16W
R318	1-216-803-11	METAL CHIP	33	5%	1/16W
R319	1-216-804-11	METAL CHIP	39	5%	1/16W
R320	1-216-845-11	METAL CHIP	100K	5%	1/16W
R321	1-216-803-11	METAL CHIP	33	5%	1/16W
R322	1-216-804-11	METAL CHIP	39	5%	1/16W

Ref. No.	Part No.	Description	Remark		
R323	1-216-845-11	METAL CHIP	100K	5%	1/16W
R324	1-216-857-11	METAL CHIP	1M	5%	1/16W
R325	1-216-857-11	METAL CHIP	1M	5%	1/16W
R326	1-216-847-11	METAL CHIP	150K	5%	1/16W
R327	1-216-845-11	METAL CHIP	100K	5%	1/16W
R328	1-216-833-11	METAL CHIP	10K	5%	1/16W
R329	1-216-821-11	METAL CHIP	1K	5%	1/16W
R330	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R331	1-216-791-11	METAL CHIP	3.3	5%	1/16W
R332	1-216-822-11	METAL CHIP	1.2K	5%	1/16W
R333	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R334	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R335	1-216-853-11	METAL CHIP	470K	5%	1/16W
R336	1-216-853-11	METAL CHIP	470K	5%	1/16W
R337	1-216-841-11	METAL CHIP	47K	5%	1/16W
R338	1-216-817-11	METAL CHIP	470	5%	1/16W
R339	1-216-821-11	METAL CHIP	1K	5%	1/16W
R340	1-216-820-11	METAL CHIP	820	5%	1/16W
R341	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R343	1-216-837-11	METAL CHIP	22K	5%	1/16W
R344	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R345	1-216-849-11	METAL CHIP	220K	5%	1/16W
R348	1-216-857-11	METAL CHIP	1M	5%	1/16W
R601	1-216-833-11	METAL CHIP	10K	5%	1/16W
R604	1-216-833-11	METAL CHIP	10K	5%	1/16W
R605	1-216-837-11	METAL CHIP	22K	5%	1/16W
R606	1-216-845-11	METAL CHIP	100K	5%	1/16W
R607	1-216-841-11	METAL CHIP	47K	5%	1/16W
R608	1-216-837-11	METAL CHIP	22K	5%	1/16W
R609	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R610	1-216-856-11	METAL CHIP	820K	5%	1/16W
R611	1-216-856-11	METAL CHIP	820K	5%	1/16W
R612	1-216-841-11	METAL CHIP	47K	5%	1/16W
R613	1-216-849-11	METAL CHIP	220K	5%	1/16W
R614	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
R615	1-216-833-11	METAL CHIP	10K	5%	1/16W
R616	1-216-832-11	METAL CHIP	8.2K	5%	1/16W
R617	1-216-174-00	METAL GLAZE	100	5%	1/8W
R618	1-216-176-00	METAL GLAZE	120	5%	1/8W
R619	1-216-852-11	METAL CHIP	390K	5%	1/16W
R620	1-216-838-11	METAL CHIP	27K	5%	1/16W
R621	1-216-839-11	METAL CHIP	33K	5%	1/16W
R622	1-216-839-11	METAL CHIP	33K	5%	1/16W
R623	1-216-857-11	METAL CHIP	1M	5%	1/16W
R624	1-216-857-11	METAL CHIP	1M	5%	1/16W
R625	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R626	1-216-841-11	METAL CHIP	47K	5%	1/16W
R627	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R628	1-216-841-11	METAL CHIP	47K	5%	1/16W

Ref. No.	Part No.	Description	Remark		
R629	1-216-687-11	METAL CHIP	33K	0.5%	1/10W
R630	1-216-653-11	METAL CHIP	1.2K	0.5%	1/10W
R632	1-216-809-11	METAL CHIP	100	5%	1/16W
R633	1-217-671-11	METAL CHIP	1	5%	1/10W
R634	1-217-671-11	METAL CHIP	1	5%	1/10W
R635	1-217-671-11	METAL CHIP	1	5%	1/10W
R636	1-217-671-11	METAL CHIP	1	5%	1/10W
R637	1-216-833-11	METAL CHIP	10K	5%	1/16W
R638	1-216-833-11	METAL CHIP	10K	5%	1/16W
R639	1-216-833-11	METAL CHIP	10K	5%	1/16W
R640	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R641	1-216-826-11	METAL CHIP	2.7K	5%	1/16W
R647	1-216-828-11	METAL CHIP	3.9K	5%	1/16W
R648	1-216-833-11	METAL CHIP	10K	5%	1/16W
R649	1-216-840-11	METAL CHIP	39K	5%	1/16W
R653	1-216-854-11	METAL CHIP	560K	5%	1/16W
R654	1-216-849-11	METAL CHIP	220K	5%	1/16W
R655	1-216-661-11	METAL CHIP	2.7K	0.5%	1/10W
R656	1-216-833-11	METAL CHIP	10K	5%	1/16W
R657	1-216-833-11	METAL CHIP	10K	5%	1/16W
R658	1-216-809-11	METAL CHIP	100	5%	1/16W
R660	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R661	1-216-841-11	METAL CHIP	47K	5%	1/16W
R662	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R663	1-216-833-11	METAL CHIP	10K	5%	1/16W
R665	1-216-841-11	METAL CHIP	47K	5%	1/16W
R666	1-216-851-11	METAL CHIP	330K	5%	1/16W
R668	1-216-833-11	METAL CHIP	10K	5%	1/16W
R669	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R670	1-216-845-11	METAL CHIP	100K	5%	1/16W
R673	1-216-841-11	METAL CHIP	47K	5%	1/16W
R674	1-216-853-11	METAL CHIP	470K	5%	1/16W
R676	1-216-833-11	METAL CHIP	10K	5%	1/16W
R677	1-216-841-11	METAL CHIP	47K	5%	1/16W
R680	1-216-845-11	METAL CHIP	100K	5%	1/16W
R681	1-216-833-11	METAL CHIP	10K	5%	1/16W
R683	1-216-821-11	METAL CHIP	1K	5%	1/16W
R684	1-216-841-11	METAL CHIP	47K	5%	1/16W
R685	1-216-821-11	METAL CHIP	1K	5%	1/16W
R687	1-216-821-11	METAL CHIP	1K	5%	1/16W
R689	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R690	1-216-841-11	METAL CHIP	47K	5%	1/16W
R691	1-216-841-11	METAL CHIP	47K	5%	1/16W
R692	1-216-841-11	METAL CHIP	47K	5%	1/16W
R693	1-216-841-11	METAL CHIP	47K	5%	1/16W
R698	1-216-861-11	METAL CHIP	2.2M	5%	1/16W
R703	1-216-821-11	METAL CHIP	1K	5%	1/16W
R704	1-216-841-11	METAL CHIP	47K	5%	1/16W
R705	1-216-817-11	METAL CHIP	470	5%	1/16W

Ref. No.	Part No.	Description	Remark		
R706	1-216-841-11	METAL CHIP	47K	5%	1/16W
R707	1-216-841-11	METAL CHIP	47K	5%	1/16W
R708	1-216-864-11	METAL CHIP	0	5%	1/16W
R709	1-216-819-11	METAL CHIP	680	5%	1/16W
R712	1-216-864-11	METAL CHIP	0	5%	1/16W
R717	1-216-864-11	METAL CHIP	0	5%	1/16W
R718	1-216-821-11	METAL CHIP	1K	5%	1/16W
R719	1-216-821-11	METAL CHIP	1K	5%	1/16W
R720	1-216-853-11	METAL CHIP	470K	5%	1/16W
R721	1-216-821-11	METAL CHIP	1K	5%	1/16W

< NETWORK RESISTOR >

RB601	1-236-412-11	NETWORK, RES 1.0K
RB602	1-236-412-11	NETWORK, RES 1.0K
RB603	1-236-424-11	NETWORK, RES 10K
RB604	1-236-412-11	NETWORK, RES 1.0K
RB605	1-236-440-11	NETWORK, RES 220K
RB606	1-236-408-11	NETWORK, RES 470
RB607	1-236-444-11	NETWORK, RES 470K
RB610	1-236-432-11	NETWORK, RES 47K
RB611	1-236-412-11	NETWORK, RES 1.0K
RB612	1-236-412-11	NETWORK, RES 1.0K
RB613	1-236-412-11	NETWORK, RES 1.0K
RB616	1-236-412-11	NETWORK, RES 1.0K
RB617	1-236-412-11	NETWORK, RES 1.0K
RB618	1-236-432-11	NETWORK, RES 47K
RB619	1-236-436-11	NETWORK, RES 100K
RB620	1-236-444-11	NETWORK, RES 470K
RB621	1-236-432-11	NETWORK, RES 47K
RB624	1-236-424-11	NETWORK, RES 10K
RB625	1-236-424-11	NETWORK, RES 10K
RB626	1-236-424-11	NETWORK, RES 10K
RB632	1-236-412-11	NETWORK, RES 1.0K
RB633	1-236-412-11	NETWORK, RES 1.0K
RB634	1-236-412-11	NETWORK, RES 1.0K
RB635	1-236-412-11	NETWORK, RES 1.0K
RB636	1-236-412-11	NETWORK, RES 1.0K

RB637	1-236-432-11	NETWORK, RES 47K
RB638	1-236-408-11	NETWORK, RES 470
RB639	1-236-432-11	NETWORK, RES 47K
RB640	1-236-432-11	NETWORK, RES 47K
RB641	1-236-432-11	NETWORK, RES 47K

< VARIABLE RESISTOR >

RV001	1-238-090-11	RES, ADJ, CERMET 10K
RV002	1-238-089-11	RES, ADJ, CERMET 4.7K
RV003	1-238-089-11	RES, ADJ, CERMET 4.7K
RV004	1-238-089-11	RES, ADJ, CERMET 4.7K
RV301	1-238-088-11	RES, ADJ, CERMET 2.2K

Ref. No.	Part No.	Description	Remark
		< FLEXIBLE BOARD >	
W607	1-639-617-11	FP-382 FLEXIBLE BOARD	
W608	1-639-616-11	FP-381 FLEXIBLE BOARD	
		< VIBRATOR >	
X601	1-579-367-21	VIBRATOR, CRYSTAL (11.9MHz)	
X602	1-578-713-21	VIBLATOR, CERAMIC (4.19MHz)	
X603	1-579-049-21	VIBRATOR, CRYSTAL (32KHz)	

		MISCELLANEOUS	

21	1-944-055-11	HARNESS (CD-26)	
51	1-466-559-51	SWITCH BLOCK, CONTROL (FK-3) (E, AUS)	
51	1-466-605-11	SWITCH BLOCK, CONTROL (FK-3) (AEP, UK)	
53	1-466-560-41	SWITCH BLOCK, CONTROL (CF-3)	
59	1-537-370-11	TERMINAL BOARD, LB	
81	1-809-425-21	DISPLAY PANEL, LIQUID CRYSTAL	
106	1-537-373-11	JACK BOARD ASSY	
131	1-547-381-12	FILTER BLOCK, OPTICAL (OFB-02-03)	
401	1-547-494-11	LENS, ZOOM (VCL-7808XA)	
IC901	8-752-606-77	IC ICX039BNA-2 (CCD IMAGER) (Note.1)	
M901	A-7048-534-A	DRUM BLOCK ASSY (DGH-80A-R)	
M902	8-835-329-12	MOTOR, DC U-21A (CAPSTAN)	
M903	1-541-607-21	MOTOR, DC (LA12G-344VA) (LOADING)	
V901	△ 1-452-565-11	CRT ASSY	

Ref. No.	Part No.	Description	Remark
		ACCESSORIES & PACKING MATERIALS	

	1-465-934-11	REMOTE COMMANDER (CAM CORDER) (RMT-504)	
	1-571-164-11	SWITCH, ANTENNA CHANGE (CABLE) (UK, E)	
	1-575-334-11	CORD, CONNECTION (VIDEO/AUDIO)	
*	1-575-335-21	CORD, CONNECTION (S VIDEO)	
*	3-704-281-01	BAG, PROTECTION (STANDARD)	
	3-712-673-01	SCREWDRIVER (UK, E)	
	3-753-410-41	MANUAL, INSTRUCTION (ENGLISH) (AEP, UK)	
	3-753-410-51	MANUAL, INSTRUCTION (AEP)	
		(FRENCH, DUTCH, SPANISH)	
	3-753-410-61	MANUAL, INSTRUCTION (AEP)	
		(DUTCH, SWEDISH, ITALIAN)	
	3-753-411-11	MANUAL, INSTRUCTION (ENGLISH)	
	3-753-411-51	MANUAL, INSTRUCTION (AEP, E)	
		(FRENCH, DUTCH, SPANISH)	
	3-753-411-61	MANUAL, INSTRUCTION (AEP)	
		(DUTCH, SWEDISH, ITALIAN)	
	3-753-411-71	MANUAL, INSTRUCTION (ARABIC) (E)	
	3-753-952-61	MANUAL, INSTRUCTION (ENGLISH) (E, AUS)	
	3-753-952-71	MANUAL, INSTRUCTION (E)	
		(FRENCH, DUTCH, ENGLISH)	
	3-753-952-81	MANUAL, INSTRUCTION (ARABIC) (E)	
	3-753-952-91	MANUAL, INSTRUCTION (CHINESE) (E)	
	3-754-229-11	INSTRUCTION, LP MODE CAUTION	
*	3-754-318-01	INSTRUCTION (AEP, E)	
	3-941-737-01	BELT, SHOULDER	
*	3-943-154-01	HOLDER, REMOTE CONTROL	
*	3-944-218-11	INDIVIDUAL CARTON	
*	3-944-229-01	CUSHION (UPPER)	
*	3-944-230-01	CUSHION (LOWER)	

HARDWARE LIST

#1	7-621-281-15	SCREW +P 2X2
#2	7-624-102-04	STOP RING 1.5, TYPE -E

Note 1

For replacement of CCD imager, CD-74 board, complete and DT-77 board, complete read carefully the CAUTIONS FOR REPLACEMENT OF CCD IMAGER on page 88.

Note: The components identified by mark △ or dotted line with mark △ are critical for safety. Replace only with part number specified.

SECTION 7 SERVICE MODE

☆This unit adopts the camera adjustment and the EVR (Electronic Variable resistor) with the SENSER LANC system.

7-1. SENSER LANC

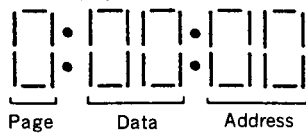
SENSER LANC is the LANC format to adjust the EVR (Electronic Variable resistor) of Video 8 Handycam and to perform tests by using the LANC (control L). This word stands for the same as the SERVICE LANC formerly used, however, the unified word "SENSER LANC" will be used with this substantial functions.

7-2. HOW TO USE RM-95 JIG (REMOTE CONTROL FOR ADJUSTMENT)

RM-95 jig is used to operate the SENSER LANC. HOLD switch of this jig is remodelled for service to get the SENSER LANC mode. Replacing microcomputer in RM-95 is required for the old-model RM-95 jig, which has no page display function.

Old model	μ PD7503G-A71-12	8-759-142-56	Page is not displayed (Replacing microcomputer is required)
	μ PD7503G-C23-12	8-759-146-77	
New model	μ PD7503G-C56-12	8-759-148-35	Page is displayed

LCD display of RM-95

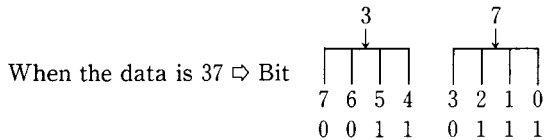


Example



This means that the page 1 and address 3D is data of 37.

7-3. Reference between Data and Bit

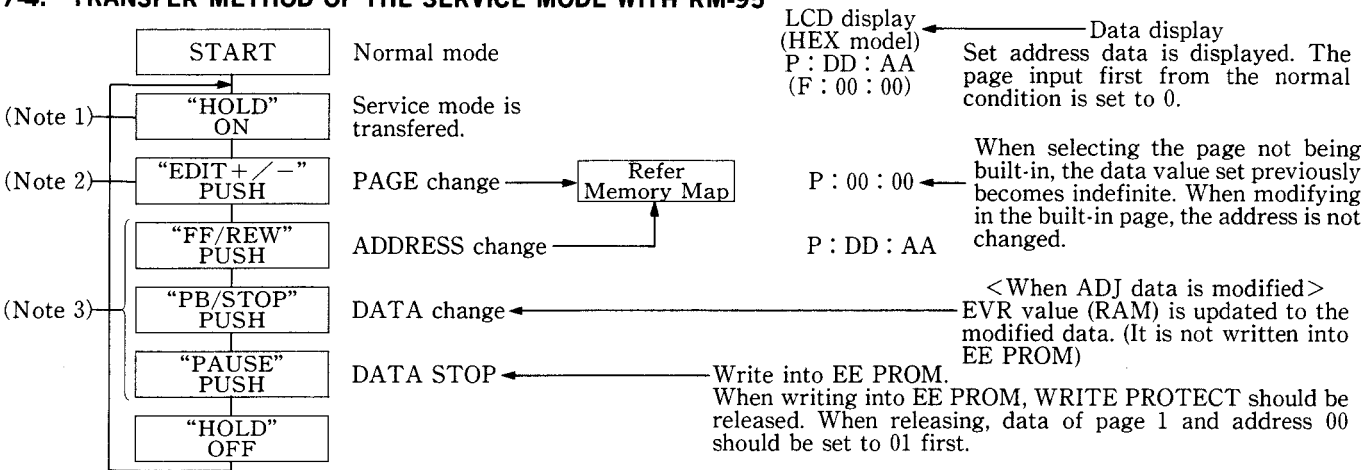


Page	Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	3D	MP-HG		ME/MP	REC PROOF	V MUTE	A MUTE	JOG	VA PB MODE
		0	0	1	1	0	1	1	1

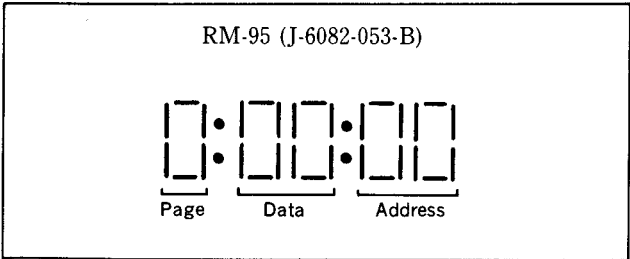
The data in the above list means as follows:

ME SW ON
 REC PROOF SW ON
 Audio mute ON
 JOG.....ON
 VA PB MODE.....ON

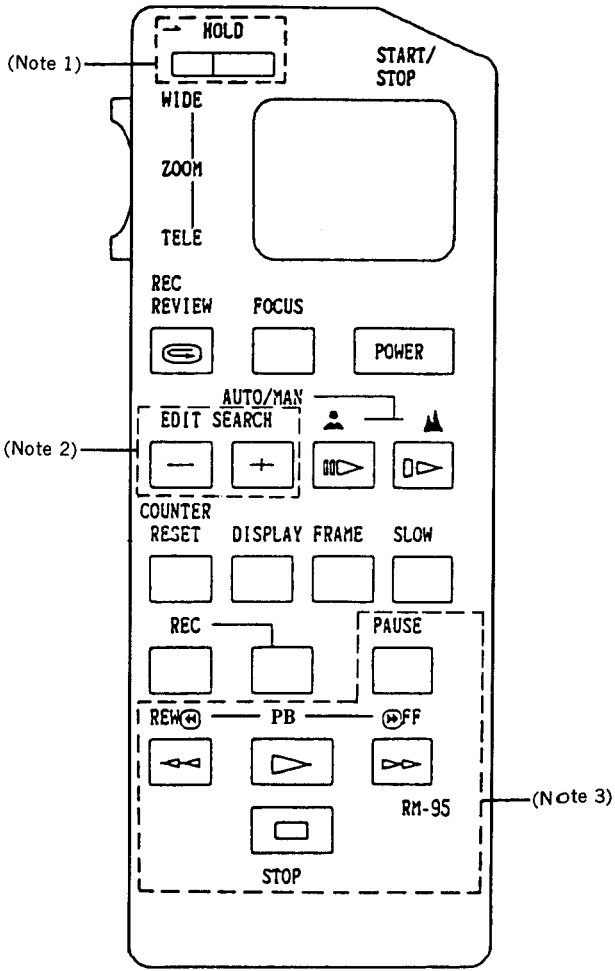
7-4. TRANSFER METHOD OF THE SERVICE MODE WITH RM-95



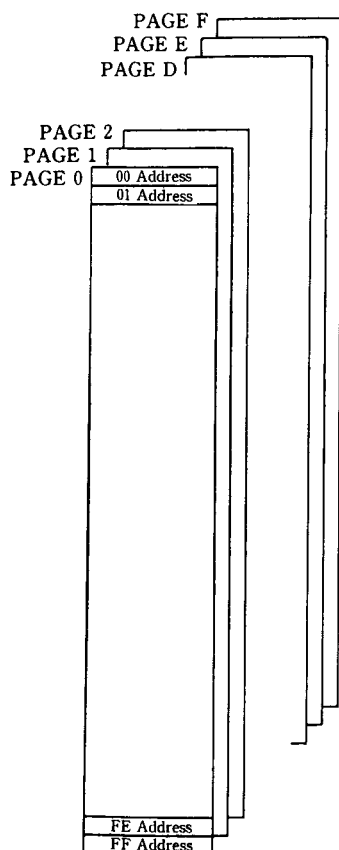
Command name	Command function	Function Button with RM-95
Page Up	Page+1	Edit Search+
Page Down	Page-1	Edit Search-
Direct Page Set	Set to direct page	Event Clear
Address Up	Address+1	Fast Forward
Address Down	Address-1	Rewind
Data Up	Data+1	Play Back
Data Down	Data-1	Stop
Store	Write data into EEPROM. RAM	Pause



RM-95 (J-6082-053-B)



7-5. SENSER LANC Memory Map



This unit has pages 0 to F allocated as listed below.

PAGE	Page allocation
0	Service
1	System Control RAM and I/O
2	System Control RAM and I/O
3	System Control RAM and I/O
4	LCD microcomputer RAM and I/O
5	Camera microcomputer RAM
6	Camera microcomputer I/O
7	Spare
8	Spare
9	Spare
A	Camera DATA
B	Spare
C	Spare
D	VTR EE-PROM
E	Spare
F	Camera EE-PROM

Note: The adjustment address 00 of the first page for the RAM is a control code for total control. This address is used to enable write to EE-PROM.

The initial data for this control code is "00" which inhibits write to EE-PROM. In order to write the VTR EE-PROM and the Camera EE-PROM, the control codes for their respective adjustment pages must be set to "01 or 80" as shown by the arrows.

Sixteen different pages from 0 to F are available. Page allocations are as listed above. Only pages D and F are allocated to such memories that will not be cleared even if the power is turned off as the EVR (electronic variable resistor).

7-6. MODES OF SELF-DIAGNOSTIC FEATURE

This unit provides the following ADJUST and TEST Modes :

MODE		Contents
ADJUST	Camera Adjustment	See Adjustment of Camera System. } See the appropriate pages.
	Switching Position Adjustment	
	Battery Down Adjustment	
TEST	Pass Adjustment Track Shift	When adjusting the tape pass, this mode is selected to shift tracking.
	Emergency STOP Inhibit	This mode inhibits detection of emergency to ensure that : ○ Power will not be turned off even if battery is exhausted (at battery END). ○ Automatic discrimination between SP and LP will not be made. ○ Emergency detection will not be made except for tape TOP/END.
	Emergency Code Read	The conventional emergency display function is added with the following functions : ①Storage in EE-PROM which eliminates a lithium battery. ②Storage of information on the first and the last emergency. ③Storage of information on the mode when an emergency occurred as well as the contents of the emergency.
	Single Motor Check	This permits normal and reverse rotations and stop of each motor separately. ○ Drum motor ○ Capstan motor ○ Loading motor
	Function Switch Check	You can check whether the Function switch of the main body has been accepted or not by specifying a certain address. Also, RM-95 can be used to issue a command in place of the Function switch of the main body.
	Mechanical Switch Check	The contents of the Mechanical and Mode switches can be checked.
	Sensor Check	Input for each of the following sensors is A/D converted and this A/D converted value can be checked. (TOP sensor, END sensor, S REEL FG, T REEL FG, SWP correction thermistor, DEW sensor)
	Received Wireless Remote Control Code Check	The contents of the control code received from the wireless remote control can be checked.

7-7. HOW TO USE PRACTICALLY

How to enter the ADJUST and TEST Modes							
Place RM-95 into Service mode (by turning the HOLD switch “ON”).							
How to change and write data							
Press the PAUSE button of RM-95. However, it is not required to press PAUSE for certain RAM and I/O areas.							
Changing and writing data in and to EE-PROM							
PROTECT must be removed before EE-PROM can be changed or written. To remove PROTECT, set as follows :							
<table><tr><td>PAGE 5</td><td>Address 00</td><td>Data 80</td></tr></table>		PAGE 5	Address 00	Data 80	(Camera system)		
PAGE 5	Address 00	Data 80					
<table><tr><td>PAGE 0</td><td>Address 00</td><td>Data 01</td></tr></table>		PAGE 0	Address 00	Data 01	(VTR system)		
PAGE 0	Address 00	Data 01					
In this latest version, the Camera system is also protected.							
How to release from each mode							
<table><tr><td>Releasing from any EE-PROM area</td><td>[Camera system] Be sure to return data on PAGE 5, address 00 to 00 from 80 before turning Service mode of RM-95 OFF. [VTR system] Be sure to return data on PAGE 0, address 00 to 00 from 01 before turning Service mode of RM-95 OFF.</td></tr><tr><td>Releasing from any RAM and I/O area</td><td>Simply turn either Service mode or power OFF because the data needs not be hold.</td></tr></table>		Releasing from any EE-PROM area	[Camera system] Be sure to return data on PAGE 5, address 00 to 00 from 80 before turning Service mode of RM-95 OFF. [VTR system] Be sure to return data on PAGE 0, address 00 to 00 from 01 before turning Service mode of RM-95 OFF.	Releasing from any RAM and I/O area	Simply turn either Service mode or power OFF because the data needs not be hold.		
Releasing from any EE-PROM area	[Camera system] Be sure to return data on PAGE 5, address 00 to 00 from 80 before turning Service mode of RM-95 OFF. [VTR system] Be sure to return data on PAGE 0, address 00 to 00 from 01 before turning Service mode of RM-95 OFF.						
Releasing from any RAM and I/O area	Simply turn either Service mode or power OFF because the data needs not be hold.						

7-8. DESCRIPTION OF ADJUST AND TEST MODES

	MODE	PAGE/DATA/ADDRESS	Contents
ADJUST	Switching Position Adjustment	D: --: 04	This is used to adjust switching position. See page 262 for details.
	Battery Down Adjustment	0: --: 02 (Sensor value) D: --: 02 (Set value)	This is used to adjust Battery Down. See page 261 for details.
TEST MODE	Pass Adjustment Track Shift	0: 03: 01	This is used to adjust track shift for pass adjustment. Write the data specified left and enter Playback mode.
	Emergency Inhibit	0: 01: 01	This inhibits detection of emergency. Power will not be turned off even if battery is exhausted (at battery END). Automatic discrimination between SP and LP will not be made. Emergency detection will be inhibited except for TOP/tape END.
	Emergency Code	D: --: 06 D: --: 07	This displays the first emergency. This displays the last emergency. (See * 1) (Bit 0: REC PROOF) (Bit 1: ME/ $\overline{\text{MP}}$) (Bit 2: Normal/ $\overline{\text{HG}}$)
	RECOG Switch Check	2: --: 73	This displays the mode switch position. RECOG Switch ON/OFF status display. (See * 2)
	Function Switch Check	0: --: 18~1B	This checks whether KEY is pressed or not. (See * 3)
	Sensor Check	0: --: 10 (T reel) 0: --: 11 (T reel)	Input for each of the following sensors is A/D converted and this A/D converted value can be checked. (S REEL FG, T REEL FG) (See * 4)
	Received Wireless Remote Control Code Check	4: --: Lower 4 bits of 3A and 3C	The contents of the control code received from the wireless remote control can be checked. (See * 5)

* 1 Emergency Code Check

These codes are displayed on the SENSOR LANC as follows :

(The emergency codes displayed are the first and the last emergency. The last emergency code will be rewritten when an emergency occurs ; only the code which occurred first is recorded for the second emergency code.

			First	Last	
PAGE	D	ADDRESS	06	07	← Emergency code
PAGE	D	ADDRESS	08	09	← Mode when the emergency occurred.

→ After your operation, be sure to rewrite addresses 06 through 09 to data 00.

(1) Emergency Codes List

In this unit, at the occurrence of an emergency, the code will be displayed on the SENSER LANC while it will be written to EE-PROM according to the following specifications :

[Display area]

Page	D	(Information is displayed at the same address of page 0.)
Address	06	Emergency Code First
	07	Emergency Code Last
	08	Emergency Mode First
	09	Emergency Mode Last

• In order to clear the contents of [the first and the last emergency] , with the SENSER LANC, write as follows :

PAGE	0	Address	00	Data	01
------	---	---------	----	------	----

After this, write data 00 to each address.

Then, return to :

PAGE	0	Address	00	Data	00
------	---	---------	----	------	----

[Emergency Code]

Code		
	00	No failure.
	01	Loading motor failure.
	02	Reel failure during unloading.
	03	Other reel failure.
	04	Capstan failure.
	05	FG failure when drum was started.
	06	No PG detection when drum was started.
	07	FG failure when drum is in steady state.
	08	No PG detection when drum is in steady state.
	09	Phase lock failure when drum is in steady state.

(2) Mechanical Modes List

SYMBOL	CODE	Decision-making authority		Code created by the mode controller after transit is complete
		Mode controller	Mechanical controller	
MECHA INITIAL	00	×	×	
MECHA EJECTED	01	○	×	
MECHA UNLOAD	31	○	×	MECHA EJECTED
MECHA UNLOAD EMERGENCY	B1	×	○	MECHA EJECTED
MECHA LOAD	12	(○)*	×	
MECHA LOAD EMERGENCY	A2	×	○	MECHA STOP (NC)
MECHA STOP	02	○	×	
MECHA STOP NC	E2	○	×	
MECHA STOP EMERGENCY 1	B2	×	○	
MECHA STOP EMERGENCY 2	C2	×	○	
MECHA STOP TOP	72	×	○	
MECHA STOP END	62	×	○	
MECHA FF	03	○	×	
MECHA REW	83	○	×	
MECHA REC	04	○	×	
MECHA REC PAUSE	14	○	×	
MECHA REC REVFW	85	○	×	MECHA REC PAUSE
MECHA REC REVRVS	95	○	×	MECHA REC REVFW
MECHA EDITSFW	A5	○	×	
MECHA EDITSRVS	B5	○	×	
MECHA PB	06	○	×	
MECHA CUE	46	○	×	
MECHA REV	56	○	×	
MECHA PB PAUSE	07	○	×	
MECHA EDIT PAUSE	F5	○	×	
MECHA F5 SLOW	27	○	×	
MECHA F29 SLOW	67	○	×	

* : This does not exit as a Final mode.

*** 2 RECOG Switch Check**

Check the following information displayed on the SENSOR LANC :

Page	Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2	73					V MUTE	MP-HG	ME/MP	REC PROOF

"1" = Normal/0 : MPHG
 "1" = ME/0 : MP
 "1" = REC inhibit

Page	Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	68	MSW C	MSW B	MSW A					

Page	Address	Bit 3
2	71	CC LOCK

— "1" when cassette compartment is locked.

*** 3 Function Switch Check** (For the description of the codes, see the previous page.)

With the SENSER LANC, set as follows :

PAGE	0	Address	18~1B	Data	See the list below.
------	---	---------	-------	------	---------------------

	Address 18	19	1A	1B
Data	KEY 0 (AN7)	KEY 1 (AN8)	KEY 2 (AN9)	KEY 3 (AN10)
55	STOP	PAUSE	TITLE ON/OFF	FOCUS ON /OFF
44	FF	REW	TITLE COLOR	FADER
33	ZERO MEMO	RESET	SHUTTER SPEED	BRIGHT LOCK
22	PB	EDIT (—)	WHITE BALANCE	TITLE MEMO
11	REC	EDIT (+)	—	—
00	No make	No make	No make	No make

PAGE	4	Address	20,26,28	Data	See the list below.
------	---	---------	----------	------	---------------------

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address 20	TIME (defined)	DATA (defined)	AREA (defined)	SUMMER TIME (defined)	TIME	DATA	AREA	SUMMER TIME
Address 26	—	BILINGUAL SUB (defined)	BILINGUAL MAIN (defined)	EDIT (defined)	—	BILINGUAL SUB	BILINGUAL MAIN	EDIT
Address 28	AUTO LOCK (defined)	Hi8 (defined)	WIND (defined)	JACK OUT (defined)	AUTO LOCK	Hi8	WIND	JACK OUT

Note : “Defined” is flagged after chattering has been made.

*** 4 To Read the A/D Converted Value** (Sensor Check)

[Operation]

With the SENSER LANC, set as follows :

PAGE	0	Address	10~13	Data	**
------	---	---------	-------	------	----

Address	Converted value (contents)
10	T-REEL FG
11	S-REEL FG
12	ATF ERROR
13	BATT SENS

The current value for one step of A/D converted data is 4.9 divided by 256≈19mV.

*** 5 To Check the Contents of Received Code from Wireless Remote Control**

[Operation]

With the SENSER LANC, set as follows :

PAGE	4	Address	3A
------	---	---------	----

The remote control code received will appear on the above page, address. This code will be displayed only when the LANC code is being touched. FF will be displayed when the code is released.

PAGE	4	Address	3C
------	---	---------	----

The category code of the remote control code received will appear in the lower 4 bits on the above page, address. [The description of the remote control codes is omitted in this manual.]

SECTION 8 MECHANICAL ADJUSTMENTS

MECHANICAL ADJUSTMENT

As to mechanical adjustment and check and parts replacement, refer to the separate "8 mm Video Mechanical Adjustment Guide II FL mechanism (Q mechanism) " .

However, follow these items shown below.

The adjustment and the marks remain the same except this model has the different drum installed.

A-7049-461-A	Rotary upper drum assembly DGR-80-R-(1)
A-7049-464-A	Rotary upper drum assembly DGR-80-R-(2)

8-1. OPERATING WITH THE CASSETTE COMPARTMENT ASSEMBLY REMOVED (See Fig. 8-1.)

1. Loading

- 1) Remove the cabinets and camera block according to the "section 2. DISASSEMBLY" in Service Manual, and supply the power to the unit (Set up the mechanism deck so as to operate.)
- 2) Push into the lock plate release arm ❶ in the direction of arrow, causing the unit to be the loading state.

2. Putting into the playback state

Note : Use SENSER LANC for this adjustment.

- 1) Set to adjustment page 0, adjustment address 01 with adjustment remote control. Then, set TEST MODE for adjustment data 01 or 81.
(When TEST MODE is activated, the rotation sensing for S and T reel turntables and other sensing functions will be suppressed, which allows tape to run.)

- 2) After completing the step 1), set the power switch to VTR.

- 3) Put the cap ❸ on the LED assembly ❷ .

- 4) Push into the lock plate release arm ❶ to load.

- 5) Press the playback button.

3. Putting into the recording state

- 1) Perform the step 1) through 4) of 2. Putting into the playback state.

- 2) Secure the push switch ❹ with an adhesive tape ❺ .

- 3) Turn on the REC switch.

4. Ejecting

- 1) Push the EJECT button.

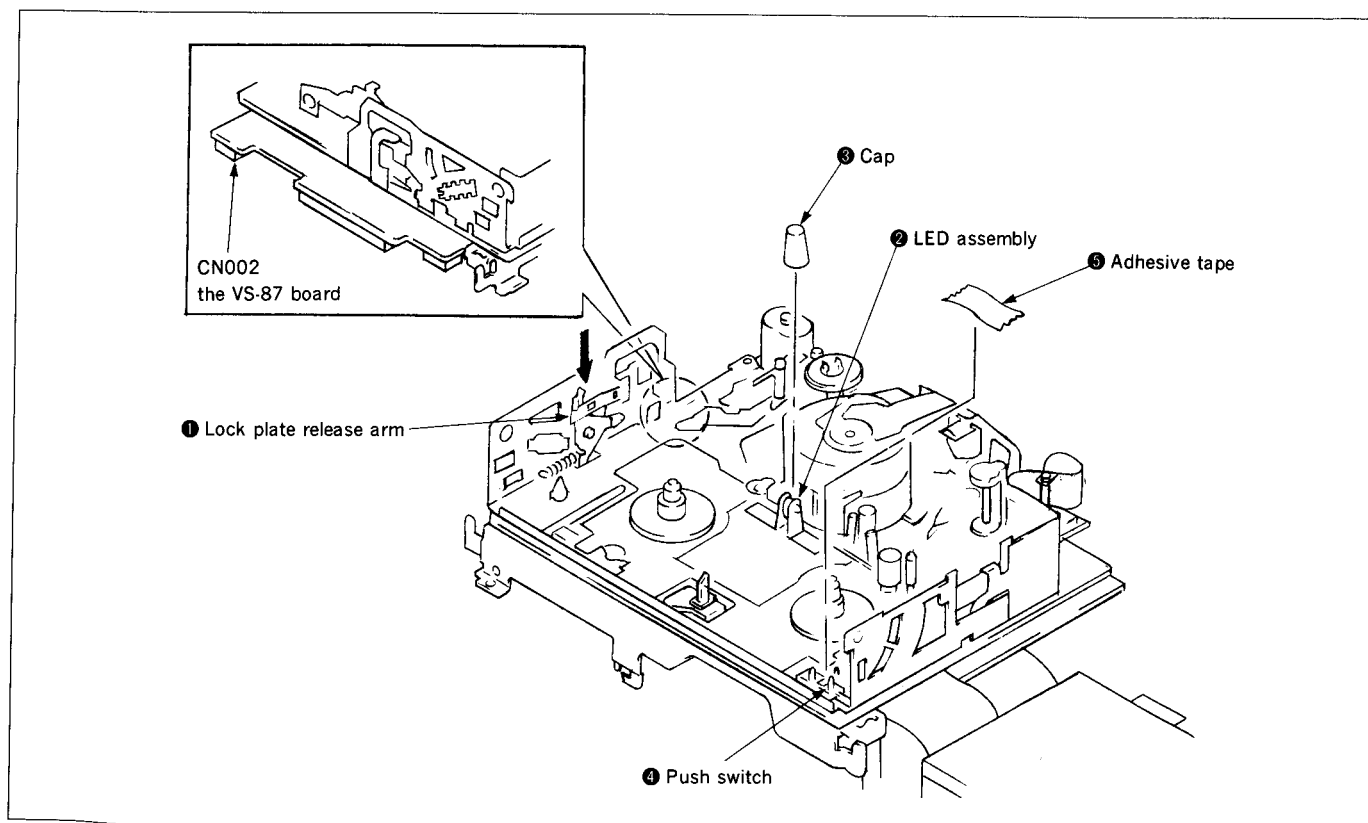


Fig. 8-1.

8-2. TAPE PATH ADJUSTMENT

1. Preparations

- 1) Clean the pass surface (tape guide, drum, capstan shaft and pinch roller.)
- 2) Short circuit Pins ④ and ⑮ of CN002 on the VS-87 board to set to PATH mode.
- 3) Connect to an oscilloscope.
(Channel 1 – Pin ⑮ of CN002 on the VS-87 board
External trigger – Pin ④ of CN002 on the VS-87 board)
- 4) Playback the tracking tape (WR5-1CP) (8-967-995-07).
- 5) Confirm that the RF waveforms at both sides of the entrance and exit on the oscilloscope are flat.
If not, perform adjustment according to the following.

CN002 on the VS-87 board

1	EJECT SW
2	LANC S10
3	CAP FG
4	PATH MODE
5	REC 2B
6	REC 2A
7	REC 1B
8	REC 1A
9	1/2 RF SWP
10	RF SW P
11	PB RF 2B
12	PB RF 2A
13	PB RF 1B
14	PB RF 1A
15	RF GND
16	PB RF

SECTION 9 CAMERA SECTION ADJUSTMENTS

See the adjusting part location diagram from on page 252 for the adjustment.

9-1. LIST OF SERVICING JIGS

- Oscilloscope • Stabilized power supply (2 units) • Adjusting screwdriver • L lench • Stop watch
- Color monitor TV • Vectorscope • Desk-top calculator

Ref. No.	Name	Part No.	Use
J-1	Filter (C14)	J-6080-054-A	
J-2	ND filter 0.1	J-6080-807-A	
	ND filter 0.4	J-6080-806-A	
	ND filter 1.0	J-6080-808-A	
J-3	Pattern box PTB-500	J-6029-140-A	
J-4	Color bar chart for pattern box	J-6020-250-A	
J-5	Extension cable (32P)	J-6082-142-A	To connect VC-106 board CN701 and LD-51 board CN854
	Extension cable (22P)	J-6082-106-A	To connect VC-106 board CN302 and TI-40 board CN801
	Extension cable (20P)	J-6082-133-A	To connect VS-87 board W607 and CF BLOCK CN901
	Extension cable (18P)	J-6082-141-A	To connect VC-106 board CN101 and CD-74 board CN901
J-6	Camera fixing jig	J-6080-894-A	
J-7	Siemens-star chart	J-6080-875-A	
J-8	Adjustment remote control * 1	J-6082-053-B	
J-9	AF microcomputer data reader jig * 2	J-6082-025-A	
J-10	CPA connector jig	J-6082-109-A	

* 1 Microcomputer IC in the adjustment Remote controller except for μ PD7503G-C56-12 (8-759-148-35) does not allow the page selecting. Replace the microcomputer in such a case.

* 2 Change the fixed number of R1 from 10k Ω to 100k Ω in the AF microcomputer data reading jig. (If the number is kept to 10k Ω , the adjustment data can not change because of the difference of the impedance.)

When adjustment the old-model Handy Cam, 100k Ω is allowed to perform the adjustment.

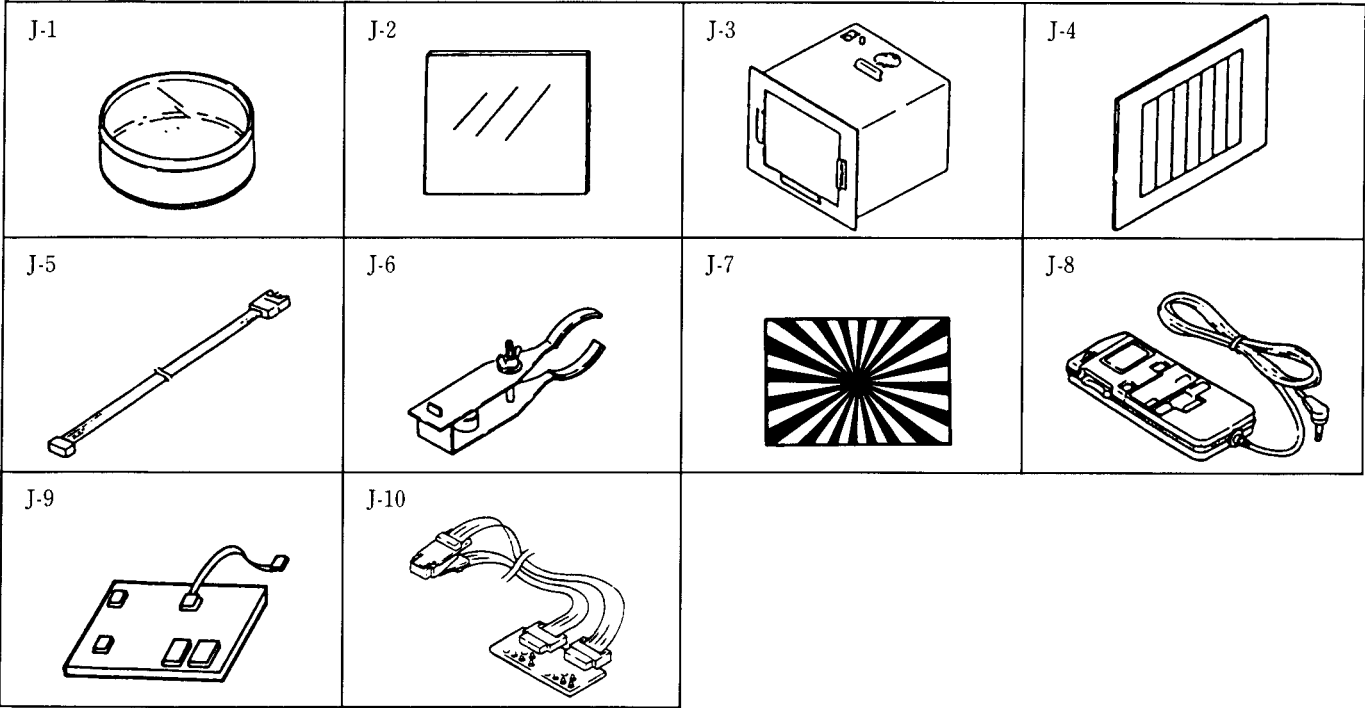


Fig. 9-1.

9-2-1. Preparation

- 1) With the extension cables, connect between the camera block and the video block and connect other equipment as shown in Fig. 9-3.

- 2) EVF (Electrical View Finder) section (VF-40 board) is necessary for checking the shutter speed, white balance mode, etc.

If not necessary, it can be removed by removing CN301 on the VS-87 board.

- 3) MIC board (MA-116 board) is not required. Remove it by removing CN903 on the MA-116 board.

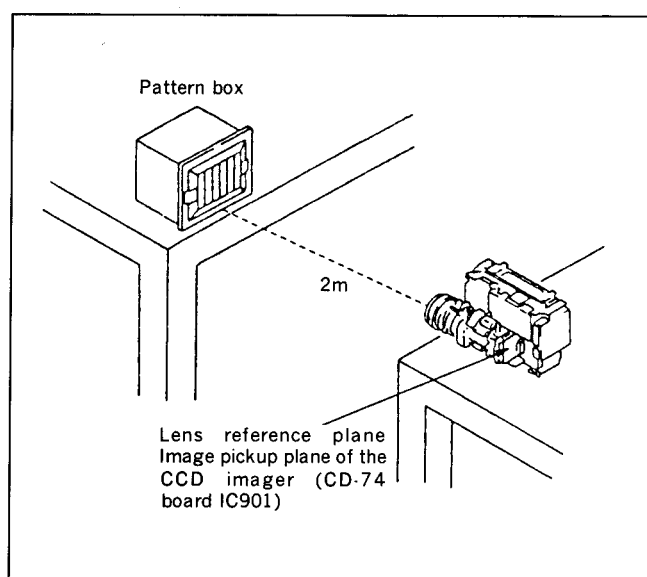


Fig. 9-2.

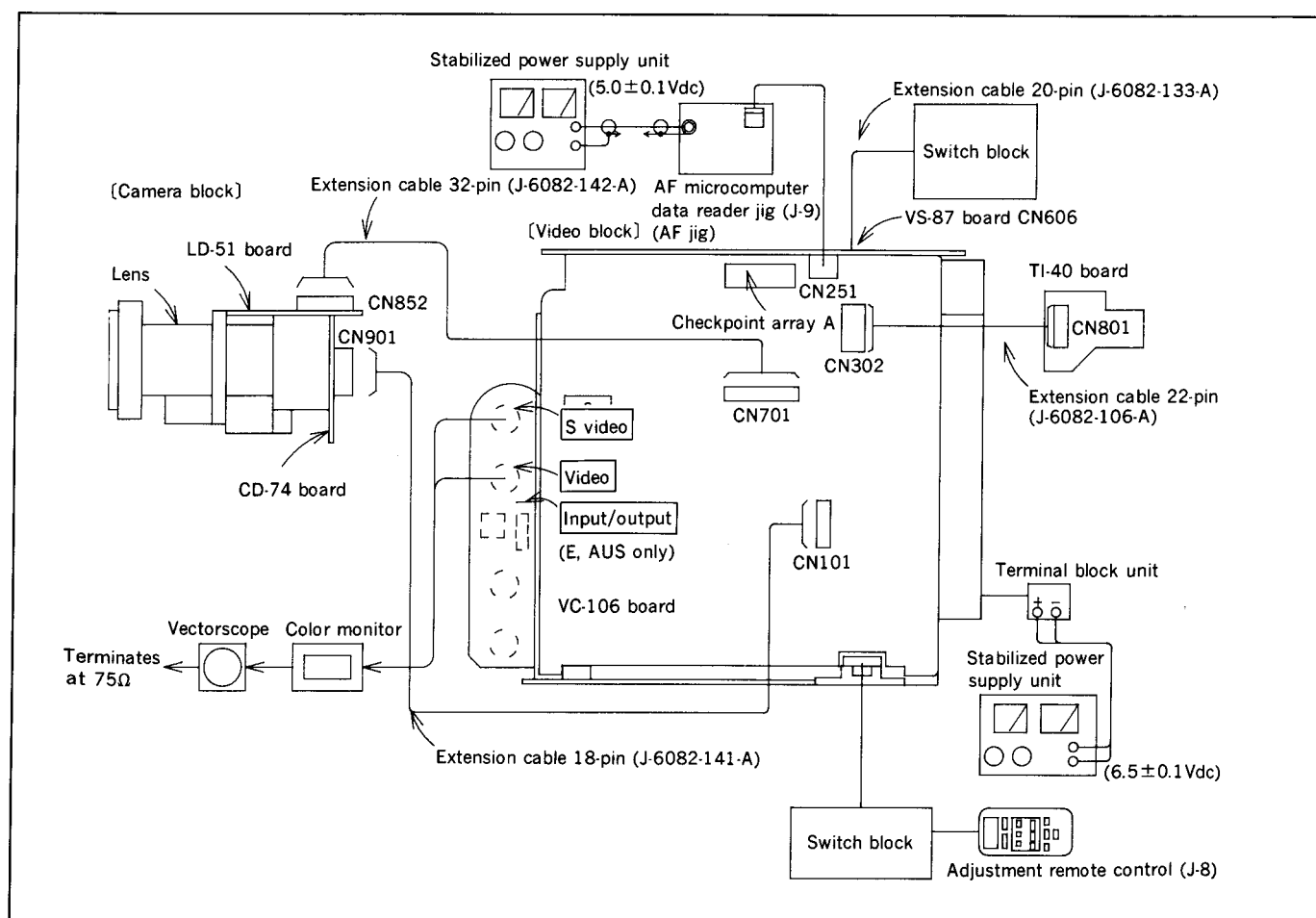


Fig. 9-3.

9-2-2. Caution

- 1) Setting of switches
Unless otherwise specified, set the switches to the following position for making adjustments.
 1. CAMERA/OFF/PLAYER switch
.....CAMERA
 2. STANDBY switch
.....STANDBY
 3. AUTO LOCK switch
.....OFF
 4. WHITE BALANCE button
.....INDOOR mode ("·A·" indication appears on EVF.)
 5. FOCUS button
.....MANUAL
 6. IRIS button
.....CENTER
 7. SHUTTER SPEED button
.....NORMAL
- 2) Adjustment order
As a rule, adjust in described order.
- 3) Objects
 1. Color bar chart (standard picture frame)
When making Adjustments by the use of a color bar chart, adjust the picture frame as shown in Fig. 9-4. (Standard picture frame)

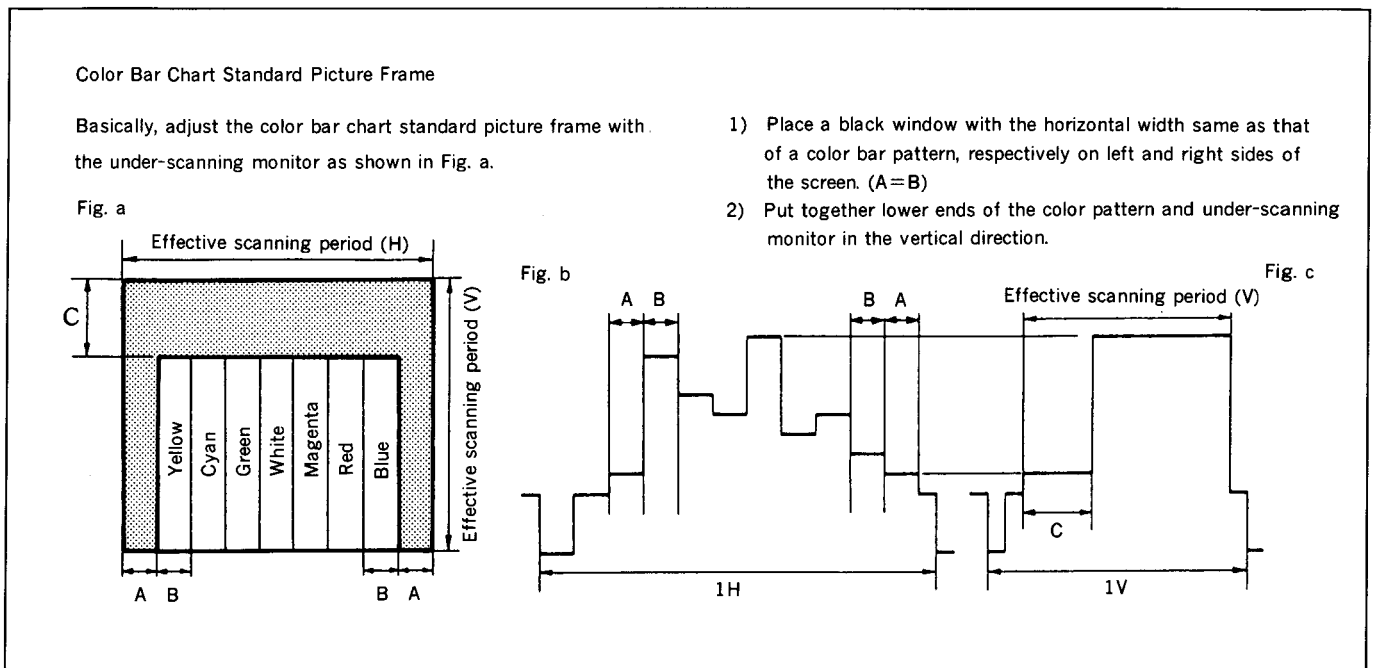


Fig. 9-4.

2. All white pattern
Remove a color bar chart from the pattern box and set fully to the TELE side.
3. Siemens star (J-6080-875-A)
orient a camera to have the siemens star center coincide with the monitor screen center on a monitor TV screen.
4. Chart for flange back adjustment
Prepare a chart as shown in Fig. 9-5 by combining white and black sheets of vellum paper of A0 size (1189mm×841mm).

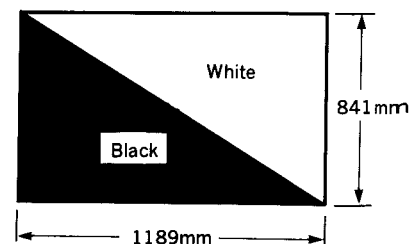


Fig. 9-5.

Note : Nonreflective, glazed vellum paper should be used. Prepare so that there is no concave or convex in the border between the black and white parts.

9-2-3. Adjustment Remote Control and Adjustment Address

The camera block uses the EVR (Electronic Variable Resistor) as an adjustment element in place of a conventional semi-fixed resistor. This EVR is controlled by the EVR/AWB microcomputer (VC-106 board IC261). This microcomputer reads data written in a non-volatile memory within the microcomputer and sends it to the EVR. The EVR generates an adjustment voltage by digital-to-analog converting this data (8 bits for one adjustment point).

To adjust the camera block, therefore, it is required to rewrite the adjustment data written in the non-volatile memory. The adjustment remote control is used for this purpose. The remote control permits bidirectional communications with the microcomputer in the camera block through a remote control signal line (LANC). UP/DOWN commands for adjustment page, address and data are sent from the remote control to the microcomputer in the camera block. Sent from the microcomputer in the camera clock to the remote control are adjustment page, address and data.

Note : The microcomputer IC within the adjustment remote control, if other than new microcomputer (μ PD7503G-C56-12), does not allow page selection. If so, replace it by new microcomputer (8-759-148-35).

1. How to Use the Adjustment Remote Control

- 1) Connect the adjustment remote control to the REMOTE terminal (HL-4 board J501).

Note : Place the HOLD switch on the adjustment remote control in the HOLD position (SERVICE position) to enter ADJ Mode.

- 2) Turn the power to the main unit ON.
- 3) If the connection is correct, the following display will appear on the adjustment remote control LCD. (The adjustment data varies from set to set.)

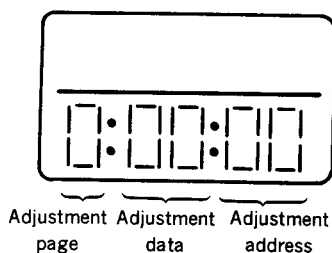


Fig. 9-6.

- 4) Specify the desired adjustment page with the adjustment remote control.
Press the EDIT SEARCH (+) button to increment the adjustment page. Press the EDIT SEARCH (−) button to decrement it.

- 5) Specify the desired adjustment address with the adjustment remote control. Press the FF (▶▶) button to increment the adjustment address. Press the REW (◀◀) button to decrement it.

(Adjustment addresses are expressed in their hexadecimal numbers and there are 256 numbers from 00 to FF. These adjustment addresses correspond to the EVR output pins (IC204, IC251 and IC255 on VC-106 board). See Table 9-2 for the contents of the adjustment for each address.)

- 6) Adjust by increasing or decreasing the adjustment data at a specific address.

Press the PLAY (▶) button to increase the adjustment data.

Press the STOP (■) button to decrease it.

- 7) To adjust on page D, set the data on page 0, address 00 to 01.

To adjust on page F, set the data on page 5, address 00 to 01 or 80. (this releases PROTECT)

- Adjustment data are expressed in their hexadecimal numbers and there are 256 numbers from 00 to FF.

Hexadecimal No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Indication of LCD	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Decimal converted value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Table 9-1.

- These adjustment data correspond to the EVR output voltages (IC204, IC251 and IC255 on VC-106 board) as follows:

VC-106 board IC204 outputs 2.0 to 4.9Vdc; VC-106 board IC251 outputs 0 to 4.9Vdc; VC-106 board IC255 outputs 1.0 to 3.5Vdc. These output voltages can be varied in 256 steps within their ranges.)

- 8) To store adjustment data into the built-in non-volatile memory in the EVR/AWB microcomputer (VC-106 board IC261), press the PAUSE button on the adjustment remote control. (If this operation is omitted, new adjustment data will not be stored into the non-volatile memory.)
- 9) There is a function provided to make a note of the last error/failure caused during operation of the set by the COUNTER RESET button so that its information will be maintained even after the power is turned off. This LAST MEMO EMERGENCY (last error/failure) can be cleared.

2. Caution for Using the Adjustment Remote Control

An erroneous operation of the adjustment remote control may delete correct adjustment data. To avoid this, it is recommended to make a note of all the adjustment data before entering adjustment and to make a note of new adjustment data each time adjustment for one item is completed.

3. List of Adjustment Addresses

- Use the adjustment page F for camera part adjustment of this unit.

Adjustment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column
01	VC-106 board IC204 pin⑩	R CONT	} Auto white balance adjustment		
02	VC-106 board IC204 pin⑪	B CONT			
03	VC-106 board IC204 pin ②	C ₁ GAIN	Matrix (3) C ₁ gain adjustment		
04	VC-106 board IC204 pin ③	B GAIN	} Pre-white balance adjustment		
05	VC-106 board IC204 pin ④	R GAIN			
06	VC-106 board IC204 pin ⑤	Y ₂ GAIN	Matrix (2) Y ₂ gain adjustment		
07	VC-106 board IC204 pin ⑥	Y ₁ GAIN	Matrix (1) Y ₁ gain adjustment		
08	VC-106 board IC204 pin ⑦	Y _H GAIN	Y _H level adjustment		
09	VC-106 board IC204 pin ⑧	R-Y GAIN	} Color reproducibility adjustment		
0A	VC-106 board IC204 pin ⑨	B-Y GAIN			
0B	VC-106 board IC204 pin⑫	R-Y HUE			
0C	VC-106 board IC204 pin⑬	B-Y HUE			
0D	VC-106 board IC251 pin⑭	SHP LEVEL	H aperture adjustment		
0E	VC-106 board IC251 pin⑮	Y LEVEL	White clip, Y level adjustment		
0F	VC-106 board IC251 pin ②	VAP GAIN		90	
10	VC-106 board IC251 pin ③	SET UP	Set up adjustment		
11	VC-106 board IC251 pin ④	C LEVEL	Chroma level adjustment		
12	VC-106 board IC251 pin ⑤	VSUB CONT	V SUB adjustment		
13	VC-106 board IC251 pin ⑥	PG CONT	PG CONT adjustment		
14	VC-106 board IC251 pin ⑦	Y _γ CONT		AE	
15	VC-106 board IC251 pin ⑧	WHITE CLIP	White clip adjustment		
16	VC-106 board IC251 pin ⑨	SYNC LEVEL	Sync level adjustment		
17	VC-106 board IC251 pin⑫	BURST LEVEL	Burst level adjustment		
18	VC-106 board IC251 pin⑬	MAX GAIN	Set up, Max gain adjustment		
19	VC-106 board IC255 pin⑭	IRIS REF	Iris adjustment		
1A	VC-106 board IC255 pin⑮	AGC REF	AGC adjustment		
1B	VC-106 board IC255 pin ②	HALL GAIN	} Hall adjustment		
1C	VC-106 board IC255 pin ③	HALL OFFSET			
1D	VC-106 board IC255 pin ④	FADER MODE		00	
1E	VC-106 board IC255 pin ⑤	R-Y MIX		FF	
1F	VC-106 board IC255 pin ⑥	B-Y MIX		8E	
20	VC-106 board IC255 pin ⑦	TH CONT		D0	
21	VC-106 board IC255 pin ⑧	FADER CONT		00	
22	VC-106 board IC255 pin ⑨	ZOOM SPEED		00	
23	VC-106 board IC255 pin⑫	M IRIS CONT		00	
24	VC-106 board IC255 pin⑬	M AGC CONT		00	
25		S LANC DRIVE		00	
26		FB TELE SLOW		E0	
27		FB PEAK H		0A	
28		FB PEAK L		BB	
29		FOCUS LIMIT		FF	

Fig. 9-2.(1)

Adjustment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column
2A		ZOOM SPEED 1		20	
2B		ZOOM SPEED 2		08	
2C		ZOOM SPEED 3		3D	
2D		FOCUS STEP H		01	
2E		FOCUS STEP L		20	
2F		TELE PEAK TH		10	
30		FB WIDE TIME		00	
31		FB ZOOM H		03	
32		FB ZOOM L		D0	
33		NOSERVO TIME		FF	
34		INIT STEP H			
35		INIT STEP L			
36		WEATHER TH		A0	
37		IN-OUT TH		60	
38		TELE DATA H			
39		TELE DATA L			
3A		NORM WIDE H			
3B		NORM WIDE L			
3C		NOSERVO SPD		20	
3D		HANT F SPD		06	
3E		PEAK BTTM H		01	
3F		PEAK BTTM L		95	
40		JIG 0	Auto focus check		
41		JIG 1			
42		JIG 2			
43		JIG 3			
44		JIG 4			
45		JIG 5			
46		T ZOOM LMT H		0F	
47		T ZOOM LMT L		E8	
48		W ZOOM LMT H		00	
49		W ZOOM LMT L		14	
4A		WIDE STEP H		00	
4B		WIDE STEP L		E7	
4C		FH SLOPE 1		08	
4D		FH SLOPE 2		08	
4E		LANC TELE		C2	
4F		LANC WIDE		3E	
50		FH WHITE		02	
51		FH AGC		03	
52		FH BLACK		09	
53		FA WHITE		01	
54		FA AGC		02	

Fig. 9-2.(2)

Adjustment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column
55		FA BLACK		04	
56		HANT Z SPD		00	
57		MF TELE		90	
58		MF WIDE		80	
59		ERR ENA STEP		05	
5A		FH REF		40	
5B		WIDE COUNT 2		02	
5C		EMER ENABLE		00	
5D		JIG 1 PAGE	Auto focus check	00	
5E		ABS POSI H		00	
5F		ABS POSI L		00	
60		_____			
61		_____			
62		_____			
63		M IRIS REF	Manual iris data adjustment		
64		GAIN REF	Manual gain data adjustment		
65		GAIN MAX		E0	
66		_____			
67		_____			
68		_____			
69		_____			
6A		_____			
6B		_____			
6C		_____			
6D		_____			
6E		_____			
6F		_____			
70		IRIS F1.7		46	
71		IRIS F2		63	
72		IRIS F2.4		76	
73		IRIS F2.8		85	
74		IRIS F3.4		8F	
75		IRIS F4		98	
76		IRIS F4.8		9E	
77		IRIS F5.6		A3	
78		IRIS F6.8		A9	
79		IRIS F8		AE	
7A		IRIS F9.6		B3	
7B		IRIS F11		B8	
7C		IRIS F14		C2	
7D		IRIS F16		CC	
7E		IRIS F19		D3	
7F		IRIS F22		D8	

Adjustment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column
80		_____			
81		_____			
82		_____			
83		_____			
84		_____			
85		_____			
86		_____			
87		_____			
88		_____			
89		_____			
8A		_____			
8B		_____			
8C		_____			
8D		_____			
8E		_____			
8F		_____			
90		R3200 MSB			
91		R3200 LSB			
92		B3200 MSB			
93		B3200 LSB			
94		G3200 MSB			
95		G3200 LSB			
96		SHUTTER IN		B1	
97		SHUTTER OUT		8B	
98		IRIS IN		9B	
99		IRIS OUT		A5	
9A		_____			
9B		_____			
9C		_____			
9D		_____			
9E		_____			
9F		_____			
A0		_____			
A1		_____			
A2		_____			
A3		_____			
A4		_____			
A5		_____			
A6		_____			
A7		_____			
A8		_____			
A9		_____			

Fig. 9-2.(4)

Adjustment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column
AA		_____			
AB		_____			
AC		BTM SLP R		48	
AD		BTM SLP B		78	
AE		MDL SLP R		60	
AF		MDL SLP B		40	
B0		TOP SLP R		66	
B1		TOP SLP B		18	
B2		KEIKO R		66	
B3		KEIKO B		18	
B4		BTM UP		C2	
B5		BTM DWN		95	
B6		MDL UP		AD	
B7		MDL DWN		96	
B8		TOP UP		78	
B9		TOP DWN		60	
BA		KEIKO		6C	
BB		KEIKO DWN		60	
BC		R TOP LMT		6E	
BD		R DWN LMT		21	
BE		B TOP LMT		8C	
BF		B IN TOP		65	
C0		B IN MAX		5C	
C1		B OUT MIN		5C	
C2		B OUT DWN		4A	
C3		B DWN LMT		1B	
C4		LL LMT		06	
C5		TM DIVID		5C	
C6		BM DIVID		39	
C7		DELAY TM		07	
C8		FAST TM		40	
C9		OUT HYS OFF		0E	
CA		OUT B HYS		07	
CB		_____			
CC		_____			
CD		_____			
CE		APCNCUT STRT		C0	
CF		APCNCUT SLPE		01	
D0		SYS CONFIG		05	
D1		_____			
D2		_____			

Fig. 9-2.(5)

Adjust- ment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column																																		
D3		_____																																					
D4		_____																																					
D5		_____																																					
D6		_____																																					
D7		_____																																					
D8		_____																																					
D9		_____																																					
DA		_____																																					
DB		_____																																					
DC		_____																																					
DD		_____																																					
DE		_____																																					
DF		_____																																					
E0		DISPLAY MODE	The following adjustment modes are selected by changing the adjustment data : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>00</td><td>R CONT, B CONT</td></tr><tr><td>01</td><td>NEW R, NEW B</td></tr><tr><td>02</td><td>R RATIO</td></tr><tr><td>03</td><td>B RATIO</td></tr><tr><td>04</td><td>R GAIN</td></tr><tr><td>05</td><td>B GAIN</td></tr><tr><td>06</td><td>RM DATA</td></tr><tr><td>07</td><td>GM DATA</td></tr><tr><td>08</td><td>BM DATA</td></tr><tr><td>0A</td><td>WHITE R, WHITE B</td></tr><tr><td>0B</td><td>R DATA</td></tr><tr><td>0C</td><td>G DATA</td></tr><tr><td>0D</td><td>B DATA</td></tr><tr><td>0E</td><td>R, B AIM</td></tr><tr><td>0F</td><td>ERROR, ERROR 2</td></tr><tr><td>11</td><td>IRIS, SHTR</td></tr></table>	Adjustment data	Adjustment mode	00	R CONT, B CONT	01	NEW R, NEW B	02	R RATIO	03	B RATIO	04	R GAIN	05	B GAIN	06	RM DATA	07	GM DATA	08	BM DATA	0A	WHITE R, WHITE B	0B	R DATA	0C	G DATA	0D	B DATA	0E	R, B AIM	0F	ERROR, ERROR 2	11	IRIS, SHTR		
Adjustment data	Adjustment mode																																						
00	R CONT, B CONT																																						
01	NEW R, NEW B																																						
02	R RATIO																																						
03	B RATIO																																						
04	R GAIN																																						
05	B GAIN																																						
06	RM DATA																																						
07	GM DATA																																						
08	BM DATA																																						
0A	WHITE R, WHITE B																																						
0B	R DATA																																						
0C	G DATA																																						
0D	B DATA																																						
0E	R, B AIM																																						
0F	ERROR, ERROR 2																																						
11	IRIS, SHTR																																						
E1		_____																																					
E2		_____																																					
E3		_____																																					
E4		_____																																					
E5		_____																																					
E6		_____																																					
E7		_____																																					
E8		_____																																					

Fig. 9-2.(6)

Adjust- ment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column																										
E9		ADJUST MODE	The following adjustment modes are selected by changing the adjustment data : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>00</td><td>NORMAL</td></tr><tr><td>03</td><td>S LANC CONTROL MODE</td></tr><tr><td>05</td><td>AF SKIP MODE</td></tr><tr><td>07</td><td>SERVICE MODE</td></tr><tr><td>09</td><td>FORCED WOBBLING MODE</td></tr><tr><td>0B</td><td>FORCED HATCHING MODE</td></tr><tr><td>0D</td><td>ZOOM HATCHING MODE</td></tr><tr><td>0F</td><td>FLANGE BACK ADJ MODE</td></tr><tr><td>13</td><td>ABS MOVERENT MODE</td></tr></table>	Adjustment data	Adjustment mode	00	NORMAL	03	S LANC CONTROL MODE	05	AF SKIP MODE	07	SERVICE MODE	09	FORCED WOBBLING MODE	0B	FORCED HATCHING MODE	0D	ZOOM HATCHING MODE	0F	FLANGE BACK ADJ MODE	13	ABS MOVERENT MODE								
Adjustment data	Adjustment mode																														
00	NORMAL																														
03	S LANC CONTROL MODE																														
05	AF SKIP MODE																														
07	SERVICE MODE																														
09	FORCED WOBBLING MODE																														
0B	FORCED HATCHING MODE																														
0D	ZOOM HATCHING MODE																														
0F	FLANGE BACK ADJ MODE																														
13	ABS MOVERENT MODE																														
EA		COMMAND MODE	The following adjustment modes are selected when the adjustment data at adjustment address E9 is 03 and 07 : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>03</td><td>SEPARATE MODE</td></tr><tr><td>07</td><td>AUTO FOCUS MODE</td></tr></table>	Adjustment data	Adjustment mode	03	SEPARATE MODE	07	AUTO FOCUS MODE																						
Adjustment data	Adjustment mode																														
03	SEPARATE MODE																														
07	AUTO FOCUS MODE																														
EB		MODE	The following adjustment modes are selected by changing the adjustment data : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>00</td><td>NORMAL MODE</td></tr><tr><td>01</td><td>ZOOM POSITION (High)</td></tr><tr><td>03</td><td>ZOOM POSITION (Low)</td></tr><tr><td>05</td><td>AD HALL</td></tr><tr><td>0B</td><td>AD AGC CONT</td></tr><tr><td>0D</td><td>FOCUS POSITION (High)</td></tr><tr><td>0F</td><td>FOCUS POSITION (Low)</td></tr><tr><td>20</td><td>FOCUS, FA, FH, ZOOM</td></tr><tr><td>21</td><td>Set by addresses 40 to 45</td></tr><tr><td>22</td><td>FB ADJ Results, INIT DATA, TELE, WIDE</td></tr><tr><td>F9</td><td>FA (Evaluation value for variable frame, every V output)</td></tr><tr><td>FB</td><td>FH (Evaluation value for variable frame, every V output)</td></tr></table>	Adjustment data	Adjustment mode	00	NORMAL MODE	01	ZOOM POSITION (High)	03	ZOOM POSITION (Low)	05	AD HALL	0B	AD AGC CONT	0D	FOCUS POSITION (High)	0F	FOCUS POSITION (Low)	20	FOCUS, FA, FH, ZOOM	21	Set by addresses 40 to 45	22	FB ADJ Results, INIT DATA, TELE, WIDE	F9	FA (Evaluation value for variable frame, every V output)	FB	FH (Evaluation value for variable frame, every V output)		
Adjustment data	Adjustment mode																														
00	NORMAL MODE																														
01	ZOOM POSITION (High)																														
03	ZOOM POSITION (Low)																														
05	AD HALL																														
0B	AD AGC CONT																														
0D	FOCUS POSITION (High)																														
0F	FOCUS POSITION (Low)																														
20	FOCUS, FA, FH, ZOOM																														
21	Set by addresses 40 to 45																														
22	FB ADJ Results, INIT DATA, TELE, WIDE																														
F9	FA (Evaluation value for variable frame, every V output)																														
FB	FH (Evaluation value for variable frame, every V output)																														

Adjust- ment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column											
EC		AWB MODE 3		01												
ED		AWB MODE 2		00												
EE		AWB MODE 1	The following auto white balance adjust- ment modes are selected by changing the adjustment data : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>00</td><td>NORMAL MODE</td></tr><tr><td>01</td><td rowspan="2">3200K PRESET DATA FETCH</td></tr><tr><td>23</td></tr><tr><td>D0</td><td>OUT DOOR ADJUST- MENT MODE</td></tr><tr><td>F0</td><td>ALL AREA PULL-IN MODE</td></tr></table>	Adjustment data	Adjustment mode	00	NORMAL MODE	01	3200K PRESET DATA FETCH	23	D0	OUT DOOR ADJUST- MENT MODE	F0	ALL AREA PULL-IN MODE		
Adjustment data	Adjustment mode															
00	NORMAL MODE															
01	3200K PRESET DATA FETCH															
23																
D0	OUT DOOR ADJUST- MENT MODE															
F0	ALL AREA PULL-IN MODE															
EF		CAM ALONE	The following adjustment modes are selected by changing the adjustment data : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>00</td><td>NORMAL MODE</td></tr><tr><td>F0</td><td>CAM ALONE MODE</td></tr></table>	Adjustment data	Adjustment mode	00	NORMAL MODE	F0	CAM ALONE MODE							
Adjustment data	Adjustment mode															
00	NORMAL MODE															
F0	CAM ALONE MODE															
F0		_____	Office Code													
F1		_____	Model Destination Code	02												
F2		_____	Shipping Date Code													
F3		_____														
F4		_____														
F5		_____														
F6		_____														
F7		_____														
F8		_____														
F9		_____														
FA		_____														
FB		_____														
FC		_____														
FD		_____														
FE		_____														
FF		_____														

Fig. 9-2.(8)

9-2-4. Checkpoint Array (CPA)

Most points of measurement used for adjusting the camera block are on the checkpoint array of the VC-106 board. Solder a short lead wire, etc. to necessary pins for your adjustment, and connect an oscilloscope or other measuring equipment. Table 9-3 shows the pin numbers and signals for the checkpoint array.

Note : The CPA connector jig can be used to connect an oscilloscope or other measuring equipment easily.

Pin No.	Signal	Pin No.	Signal
A1	N.C	B1	N.C
A2	PG CONT	B2	N.C
A3	N.C	B3	Y LPF OUT
A4	CAM Y (Not allowed to be used for adjustment)	B4	V SUB
A5	VAP OUT	B5	VAP SLICE
A6	TP	B6	N.C
A7	WB-G	B7	Y _H GAIN
A8	CAM Y	B8	Y ₂ GAIN
A9	N.C	B9	N.C
A10	CAM C	B10	GND
A11	YH OUT 1	B11	IRIS OUT

Table 9-3.

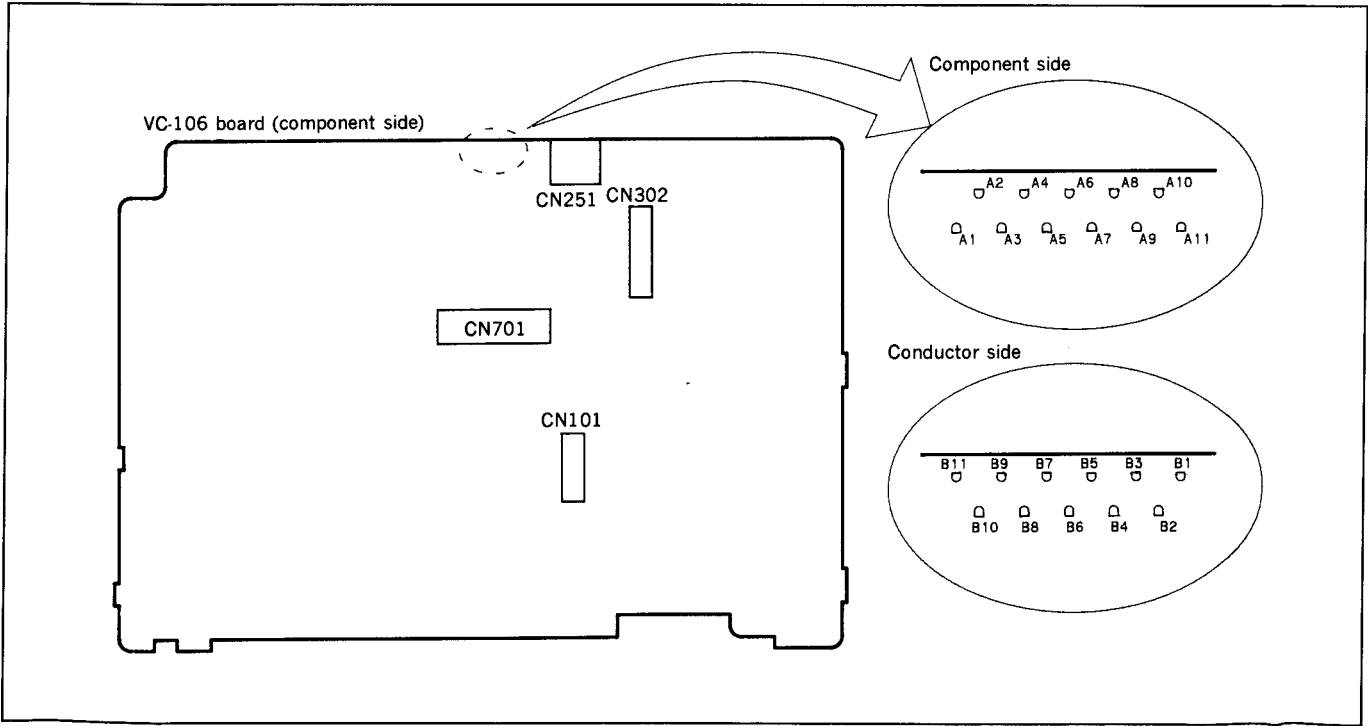


Fig. 9-7.

9-2-5. AF Microcomputer Data Reader Jig

The AF microcomputer data reader jig converts adjustment serial data outputted from the AF microcomputer (different data are outputted depending on the adjustment mode, such

as HALL (iris) state, focus state, focus motor speed, zoom ring position, etc.) into 2-digit hexadecimal numbers and indicates on the LED.

[Connection]

Connect as shown in the figure below :

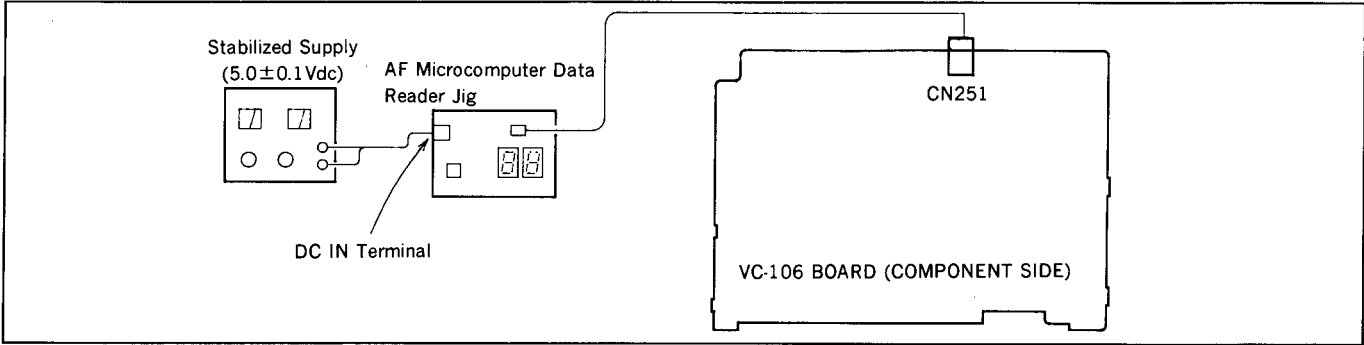


Fig. 9-8.

9-2-6. Data Processing

In order to obtain adjustment data in some adjustment items, it is necessary to compute the display data (hexadecimal number) of the AF microcomputer data reader jig and adjustment remote control.

In this case, convert the hexadecimal number into the decimal number before computation, convert its computed result back into the decimal number to assume it as the adjustment data. Table 9-4 shows a hexadecimal-decimal conversion table.

Hexadecimal — Decimal Conversion Table

Higher Digit of Hex. No. Lower Digit of Hex. No.																
	0	1	2	3	4	5	6	7	8	9	A (ア)	B (イ)	C (エ)	D (オ)	E (カ)	F (ク)
0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
3	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
4	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
5	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
6	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
7	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
8	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
9	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
A (カ)	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
B (ク)	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
C (ケ)	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
D (コ)	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
E (コ)	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
F (ク)	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

Note: Values in parentheses are those displayed on the AF microcomputer reader jig or adjustment remote control.

(Example) When the AF microcomputer reader jig or adjustment remote control displays “BD (イ オ)”; Since the higher digit of the hexadecimal number is B (イ) and its lower digit is D (オ), the decimal number to be obtained is “189” at an intersecting point of ① and ② in the table above.

Table. 9-4.

9-3. CAMERA SYSTEM ADJUSTMENT

- It is expected that all the adjustments be performed in the sequence that they are described.
- When the CCD imager has been replaced, remember to perform all the adjustments provided for the camera system.

[Adjustment Sequence]

1. Camera DC-DC Converter Voltage Check
2. Camera Microcomputer Data Setting for Adjustment Pages D and F
3. Prime Oscillation Adjustment
4. PLL Adjustment
5. PG CONT/V SUB Adjustment
6. Sync Level Adjustment
7. Setup Adjustment
8. Iris Adjustment
9. AGC Adjustment
10. Matrix Adjustment
11. Y_H Level Adjustment
12. Chroma Level Adjustment
13. White Clip Adjustment
14. Y Level Adjustment
15. Max Gain Adjustment
16. H Aperture Adjustment
17. Burst Level Adjustment
18. Pre-white Balance Adjustment
19. Color Reproducibility Adjustment
20. Flange Back Adjustment and Check
21. Hall Adjustment
22. Auto White Balance Adjustment
23. Manual Gain Reference Setting
24. Manual Iris Data Adjustment
25. Outdoor White Balance Check
26. Auto Focus Check
27. Brightness Correction Check
28. Digital Titler Picture Quality Check

9-3-1. Camera DC-DC Converter Voltage Check (DD-33P Board)

Measuring instrument	Digital voltmeter
CAM 15V check	
Measurement Point	CN102 pin ⑧ (JL303)
Specified value	$15.0 \pm 0.15V_{dc}$
CAM -9V check	
Measurement Point	CN102 pin ⑦ (JL305)
Specified value	$-9.00 \pm 0.30V_{dc}$
CAM 5V check	
Measurement Point	CN102 pin ⑤ (JL307)
Specified value	$4.92 \pm 0.03V_{dc}$

[Checking Method]

- 1) Each power supply voltage meets the specified value at ordinary temperature and humidity.

9-3-2. Camera Microcomputer Data Setting for Adjustment Pages D and F

[D Page Setting Method]

- 1) To release adjustment page D from PROTECT, set to adjustment page 0, adjustment address 00, and adjustment data 01 with the adjustment remote control.
- 2) Set to adjustment page D with the adjustment remote control. Then write the initial value. (See Table 9-5.)
- 3) After changing adjustment data, to store the new data, press the PAUSE button on the adjustment remote control before changing the address.

[F Page Setting Method]

- 1) To release adjustment page F from PROTECT, set to adjustment page 5, adjustment address 00, and adjustment data 80 with the adjustment remote control.
- 2) Set to adjustment page F with the adjustment remote control. Then write the initial value. (See Table 9-6.)
- 3) After changing adjustment data, to store the new data, press the PAUSE button on the adjustment remote control before changing the address.

Note : The adjustment data should be initialized only when the CCD imager is replaced.

The data for the old microcomputer should remain intact when the EVR/AWB microcomputer is replaced.

Table 9-5 VTR EE-PROM Memory Map on Adjustment Page D

Page	Address	Contents	Data	Remarks
D	00	Category Code (destination)	01	Fixed
	01	Test Mode	00	*
	02	Battery End Adjustment	00	Adjust
	03	Switching Position Adjustment LOW	00	Not used
	04	Switching Position Adjustment HIGH	80	Adjust
	05	Specification Change by Destination Flag	AEP,UK:90 E,AUS:91	Fixed
	06	Emergency Code First	00	*
	07	Emergency Code Last	00	*
	08	Emergency Mode First	00	*
	09	Emergency Mode Last	00	*
	0A		00	Not used
	0B		00	Not used
	0C		00	Not used
	0D		00	Not used
	0E		00	Not used
	0F		00	Not used
	10	EDIT OFF MP HI8 LP	5F	Fixed
	11	EDIT OFF MP HI8 SP	65	Fixed
	12	EDIT OFF MP NOR LP	5C	Fixed
	13	EDIT OFF MP NOR SP	68	Fixed
	14	EDIT OFF ME HI8 LP	65	Fixed
	15	EDIT OFF ME HI8 SP	69	Fixed
	16	EDIT OFF ME NOR LP	5C	Fixed
	17	EDIT OFF ME NOR SP	68	Fixed
	18	EDIT ON ** HI8 **	65	Fixed
	19	EDIT ON ** NOR **	5C	Fixed
	1A		00	Not used
	1B		00	Not used
	1C		00	Not used
	1D		00	Not used
	1E		00	Not used
	1F		00	Not used
	20	MP REC C 1A	FF	Adjust
	21	MP REC C 1B	FF	Adjust
	22	MP REC C 2A	FF	Adjust
	23	MP REC C 2B	FF	Adjust
	24	ME PILOT CONT	90	Fixed
	25	ME RF CONT	58	Fixed
	26	ME REC C 1A	FF	Adjust
	27	ME REC C 1B	FF	Adjust
	28	ME REC C 2A	FF	Adjust
	29	ME REC C 2B	FF	Adjust
	2A	REC Y	FF	Adjust
	2B	C FG OFF SET	80	Adjust
	2C	MP PILOT CONT	90	Fixed
	2D	MP RF CONT	58	Fixed
	2E		00	Spare
	2F		00	Spare
	30		00	Spare
	31		00	Spare

Note : “*” mark represents the TEST and SERVICE Modes.

Table 9-6. Preset Data of Adjustment Page F.

Adjustment Address	Adjustment Data Initial Value
01 (R CONT)	61
02 (B CONT)	6C
03 (C1 GAIN)	88
04 (B GAIN)	8D
05 (R GAIN)	84
06 (Y2 GAIN)	9B
07 (Y1 GAIN)	A2
08 (YH GAIN)	32
09 (R-Y GAIN)	B5
0A (B-Y GAIN)	84
0B (R-Y HUE)	5A
0C (B-Y HUE)	50
0D (SHP LEVEL)	97
0E (Y LEVEL)	9C
0F (VAP GAIN)	90
10 (SET UP)	95
11 (C LEVEL)	7F
12 (V SUB CONT)	3A
13 (PG CONT)	5A
14 (Y _γ CONT)	AE
15 (WHITE CLIP)	FF
16 (SYNC LEVEL)	C2
17 (BURST LEVEL)	D9
18 (MAX GAIN)	E0
19 (IRIS REF)	4C
1A (AGC REF)	72
1B (HALL GAIN)	6E
1C (HALL OFFSET)	8A
1D (FADER MODE)	00
1E (R-Y MIX)	FF
1F (B-Y MIX)	8E
20 (TH CONT)	D0
21 (FADER CONT)	00
22 (ZOOM SPEED)	00
23 (M IRIS CONT)	00
24 (M AGC CONT)	00
25 (S LANC DRIVE)	00
26 (FB TELE SLOW)	E0
27 (FB PEAK H)	0A
28 (FB PEAK L)	BB
29 (FOCUS LIMIT)	FF

Table 9-6 (1)

2A (ZOOM SPEED 1)	20
2B (ZOOM SPEED 2)	08
2C (ZOOM SPEED 3)	3D
2D (FOCUS STEP H)	01
2E (FOCUS STEP L)	20
2F (TELE PEAK TH)	10
30 (FB WIDE TIME)	00
31 (FB ZOOM H)	03
32 (FB ZOOM L)	D0
33 (NOSERVO TIME)	FF
34 (INIT STEP H)	00
35 (INIT STEP L)	C0
36 (WEATHER TH)	A0
37 (IN-OUT H)	60
38 (TELE DATA H)	0F
39 (TELE DATA L)	FF
3A (NORM WIDE H)	00
3B (NORM WIDE L)	00
3C (NOSERVO SPD)	20
3D (HANT F SPD)	06
3E (PEAK BTTM H)	01
3F (PEAK BTTM L)	95
46 (T ZOOM LMT H)	0F
47 (T ZOOM LMT L)	E8
48 (W ZOOM LMT H)	00
49 (W ZOOM LMT L)	14
4A (WIDE STEP H)	00
4B (WIDE STEP L)	E7
4C (FH SLOPE 1)	08
4D (FH SLOPE 2)	08
4E (LANC TELE)	C2
4F (LANC WIDE)	3E
50 (FH WHITE)	02
51 (FH AGC)	03
52 (FH BLACK)	09
53 (FA WHITE)	01
54 (FA AGC)	02
55 (FA BLACK)	04
56 (HANT Z SPD)	00
57 (MF TELE)	90
58 (MF WIDE)	80
59 (ERR ENA STEP)	05

Table 9-6 (2)

5A (FH REF)	40
5B (WIDE COUNT 2)	02
5C (EMER ENABLE)	00
5D (JIG 1 PAGE)	00
5E (ABS POSI H)	00
5F (ABS POSI L)	00
63 (M IRIS REF)	AA
64 (GAIN REF)	23
65 (GAIN MAX)	E0
70 (IRIS F1.7)	46
71 (IRIS F2)	63
72 (IRIS F2.4)	76
73 (IRIS F2.8)	85
74 (IRIS F3.4)	8F
75 (IRIS F4)	98
76 (IRIS F4.8)	9E
77 (IRIS F5.6)	A3
78 (IRIS F6.8)	A9
79 (IRIS F8)	AE
7A (IRIS F9.6)	B3
7B (IRIS F11)	B8
7C (IRIS F14)	C2
7D (IRIS F16)	CC
7E (IRIS F19)	D3
7F (IRIS F22)	D8
90 (R3200 MSB)	10
91 (R3200 LSB)	10
92 (B3200 MSB)	10
93 (B3200 LSB)	10
94 (G3200 MSB)	10
95 (G3200 LSB)	10
96 (SHUTTER IN)	B1
97 (SHUTTER OUT)	8B
98 (IRIS IN)	9B
99 (IRIS OUT)	A5
AC (BTM SLP R)	48
AD (BTM SLP B)	78
AE (MDL SLP R)	60
AF (MDL SLP B)	40

Table 9-6 (3)

B0 (TOP SLP R)	66
B1 (TOP SLP B)	18
B2 (KEIKO R)	66
B3 (KEIKO B)	18
B4 (BTM UP)	C2
B5 (BTM DWN)	95
B6 (MDL UP)	AD
B7 (MDL DWN)	96
B8 (TOP UP)	78
B9 (TOP DWN)	60
BA (KEIKO)	6C
BB (KEIKO DWN)	60
BC (R TOP LMT)	6E
BD (R DWN LMT)	21
BE (B TOP LMT)	8C
BF (B IN TOP)	65
C0 (B IN MAX)	5C
C1 (B OUT MIN)	5C
C2 (B OUT DWN)	4A
C3 (R DWN LMT)	1B
C4 (LL LMT)	06
C5 (TM DIVID)	5C
C6 (BM DIVID)	39
C7 (DELAY TM)	07
C8 (FAST TM)	40
C9 (OUT HYS OFF)	0E
CA (OUT B HYS)	07
CE (APCNCUT STRT)	C0
CF (APCNCUT SLPE)	01
D0 (SYS CONFIG)	05
EC (AWB MODE 3)	01
ED (AWB MODE 2)	00

Table 9-6 (4)

9-3-3. Prime Oscillation Adjustment (VC-106 Board)

Object	Any
Measurement Point	DT-77 board (HIC101) pin ③ (CL109)
Measuring instrument	Frequency counter
Adjustment element	CT101
Specified value	14187500±70Hz

Note : Connect a frequency counter through a buffer amplifier (etc., oscilloscope) having a high impedance and a low capacitance.

[Adjustment Method]

- 1) Adjust to 14187500±70Hz with CT101.

9-3-4. PLL Adjustment (VC-106 Board)

Object	Optional
Measurement Point	See Fig. 9-9. (CL152)
Measuring instrument	Digital voltmeter
Adjustment element	CT151
Specified value	2.5±0.1Vdc

[Adjustment Method]

- 1) Adjust to 2.5±0.1Vdc with CT151.

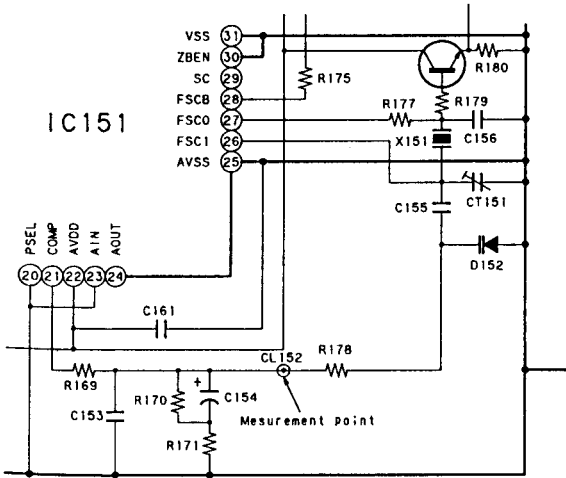
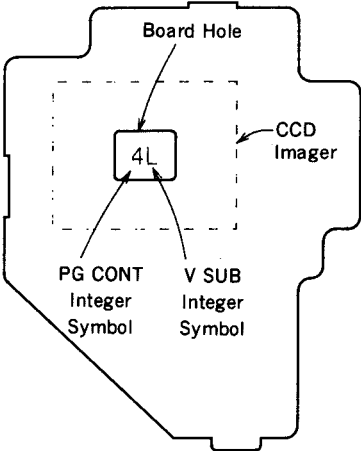


Fig. 9-9.

9-3-5. PG CONT/V SUB Adjustment (CD-74 Board/VC-106 Board)

Note : The PG CONT specification voltage and the V SUB specification voltage are indicated in two characters (the first for PG CONT and the second for V SUB) on the CCD imager as shown below.

CD-74 BOARD (COMPONENT SIDE)



• PG CONT Adjustment

PG voltage conversion table	
Integer symbol	Voltage [V]
1	1.0
2	1.5
3	2.0
4	2.5
5	3.0
6	3.5
7	4.0

• V SUB Adjustment

V SUB voltage conversion table			
Integer symbol	Voltage [V]	Integer symbol	Voltage [V]
E	9.0	Q	14.0
F	9.5	R	14.5
G	10.0	S	15.0
H	10.5	T	15.5
J	11.0	U	16.0
K	11.5	V	16.5
L	12.0	W	17.0
M	12.5	X	17.5
N	13.0	Y	18.0
P	13.5	Z	18.5

Fig. 9-10.

A. PG CONT Adjustment

Object	No required
Measurement Point	Checkpoint array pin (A2)(PG CONT)
Measuring instrument	Digital voltmeter
Adjustment page	F
Adjustment address	13 (PG CONT)
Specified value	(CCD imager indicated voltage) $\pm 0.1\text{Vdc}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00, and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 13 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control to obtain (CCD imager indicated value) $\pm 0.1\text{Vdc}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

B. V SUB Adjustment

Object	No required
Measurement Point	Checkpoint array pin (B4)(V SUB)
Measuring instrument	Digital voltmeter
Adjustment page	F
Adjustment address	12 (V SUB)
Specified value	(CCD imager indicated voltage) $\pm 3\%$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00, and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 12 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control to obtain (CCD imager indicated value) $\pm 3\%$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

9-3-6. Sync Level Adjustment (VC-106 Board)

Object	All black (Cover the lens with a black cap.)
Measurement point	Checkpoint array pin (A8)(CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	16 (SYNC LEVEL)
Specified value	$150 \pm 5\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00, and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 16 with the adjustment remote control.
- 4) Change the adjustment data to adjust the sync level to $150 \pm 5\text{mV}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

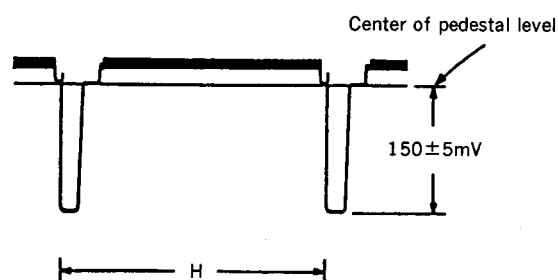


Fig. 9-11.

9-3-7. Setup Adjustment (VC-106 Board)

Object	All black (Cover the lens with a black cap.)
Measurement point	Checkpoint array pin ⑧ (CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	10 (SET UP) 18 (MAX GAIN)
Specified value	0–5mV

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 18 with the adjustment remote control. Make a note of the adjustment data for this address (as data F), then preset the adjustment data to 00. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Select adjustment address 10 with the adjustment remote control.
- 5) Change the adjustment data to adjust the setup level to 0–5mV. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Select adjustment address 18 and input the data F.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

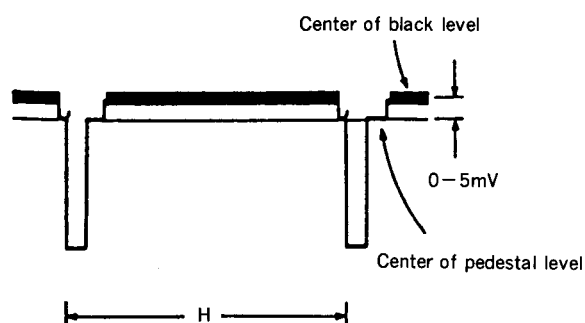


Fig. 9-12.

9-3-8. Iris Adjustment (VC-106 Board)

Object	Color bar chart standard picture frame
Filter	ND filters 0.5
Measurement point	Checkpoint array pin ⑨ (IRIS OUT)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	19 (IRIS REF)
Specified value	$150 \pm 5\text{mVp-p}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 19 with the adjustment remote control.
- 4) With no ND filter attached, change the adjustment data to adjust the IRIS OUT signal level to $150 \pm 5\text{mVp-p}$ with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 5) Attach the ND filter 0.5 in front of the lens and confirm that the signal level changes smoothly.
- 6) Remove the ND filter and check that the signal level is at $150 \pm 10\text{mVp-p}$.
- 7) If the specification is not met, repeat Steps 4) to 6).
- 8) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

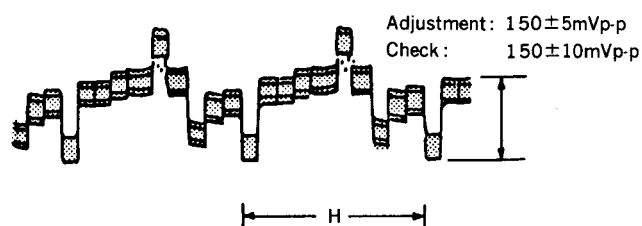


Fig. 9-13.

9-3-9. AGC Adjustment (VC-106 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (B3)(Y LPF OUT)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	1A (AGC REF)
Specified value	$180 \pm 5\text{mV}$

Note : If there is significant noise, insert a $5.6\text{k}\Omega$ resistance for measurement.

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 1A with the adjustment remote control.
- 4) Change the adjustment data to adjust the signal level to $180 \pm 5\text{mVp-p}$ with the adjustment remote control.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

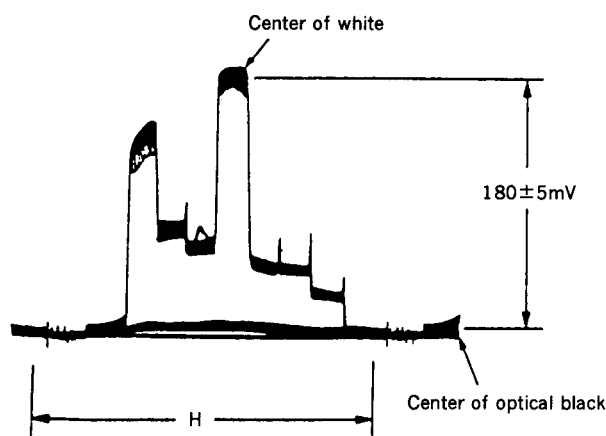


Fig. 9-14.

9-3-10. Matrix Adjustment

(1) Y₁ Gain Adjustment (VC-106 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (A5)(VAP OUT)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	07 (Y ₁ GAIN)
Specified value	$0 \pm 5\text{mV}$

[Preparation]

- 1) Short the checkpoint array pin (B8)(Y₂ GAIN) and pin (B5)(VAP SLICE) with GND.

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 0F and preset the adjustment data to 00 (VAP GAIN: MAX) with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Select adjustment address 07 with the adjustment remote control.
- 5) Change the adjustment data with the adjustment remote control and adjust so that the waveform is a straight line (there should be no difference: $0 \pm 5\text{mV}$).
- 6) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 7) Open the checkpoint array pin (B8) and pin (B5).

Note : After this adjustment, remember to perform Matrix Adjustment (2) Y₂ Gain Adjustment.

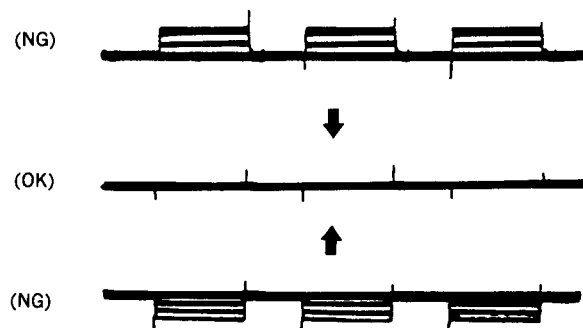


Fig. 9-15.

(2) Y₂ Gain Adjustment (VC-106 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (A5)(VAP OUT)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	06 (Y ₂ GAIN)
Specified value	0±5mV

[Preparation]

- 1) Short the checkpoint array pin (B5)(VAP SLICE) with GND.

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 0F and preset the adjustment data to 00 (VAP GAIN: MAX) with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Select adjustment address 06 with the adjustment remote control.
- 5) Change the adjustment data with the adjustment remote control and adjust so that the waveform output is a straight line (there should be no difference: 0±5mV). Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Select adjustment address 0F and set the adjustment data to 90 with the adjustment remote control.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 8) Open the checkpoint array pin (B5).

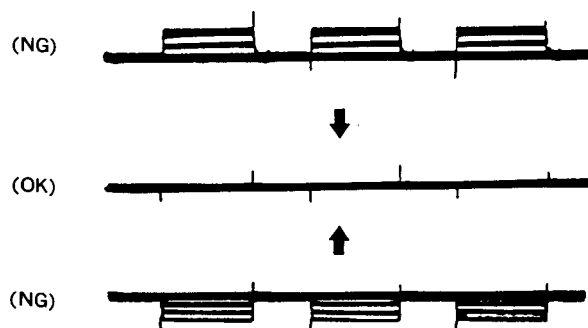


Fig. 9-16.

(3) C₁ Gain Adjustment (VC-106 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array (A10) pin (CAM C) (IC254 pin (1) and pin (47))
Measuring instrument	Vectorscope Oscilloscope
Adjustment page	F
Adjustment address	03 (C ₁ GAIN)
Specified value	Reduce the bright point split to the minimum level. • Cyan, green 2.0mm max • Magenta 1.0mm max • Others 0.5mm max

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 03 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust so that the bright point of each color is completely focused on one point within the specified value.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

When a vectorscope is used:

Specified value: Cyan } 2.0mm max
 Green }
 Magenta 1.0mm max
 Others 0.5mm max

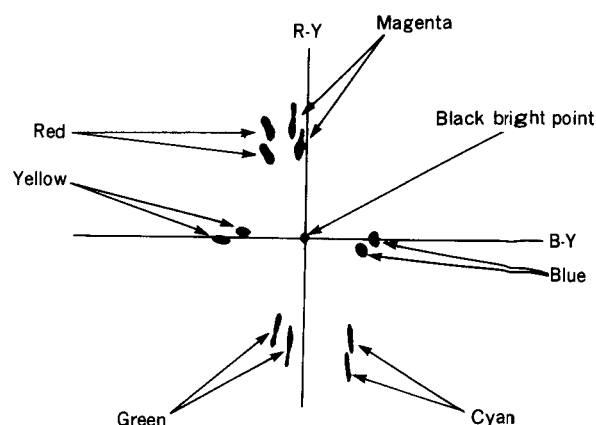


Fig. 9-17.

9-3-11. Y_H Level Adjustment (VC-106 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (A9)(TP)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	08 (Y_H GAIN)
Specified value	$0 \pm 5\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 08 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust so that the waveform output is a straight line (there should be no difference : $0 \pm 5\text{mV}$).
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

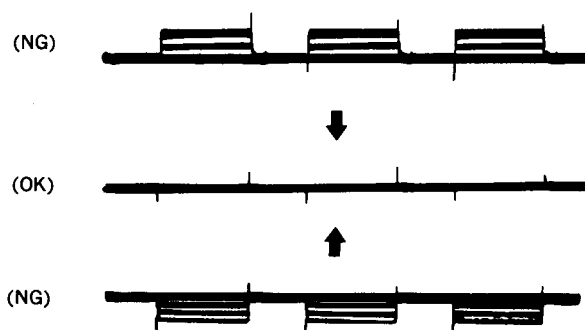


Fig. 9-18.

9-3-12. Chroma Level Adjustment (VC-106 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (A7)(WB-G)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	11 (C LEVEL)
Specified value	$320 \pm 20\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 11 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust the white level to $320 \pm 20\text{mV}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

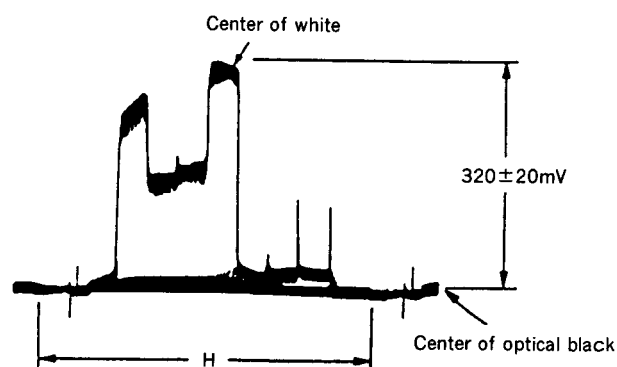


Fig. 9-19.

9-3-13. White Clip Adjustment (VC-106 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin ⑧(CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	15 (WHITE CLIP) 0E (Y LEVEL)
Specified value	$420 \pm 10\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 0E and make a note of the adjustment data for this address (this data is treated as data G), then preset the adjustment data to FF with the remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Select adjustment address 15 with the adjustment remote control.
- 5) Change the adjustment data with the adjustment remote control and adjust the white clip level to $420 \pm 10\text{mV}$. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Select adjustment address 0E and input the data G with the adjustment remote control.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

Note : After this adjustment, remember to perform Y Level Adjustment.

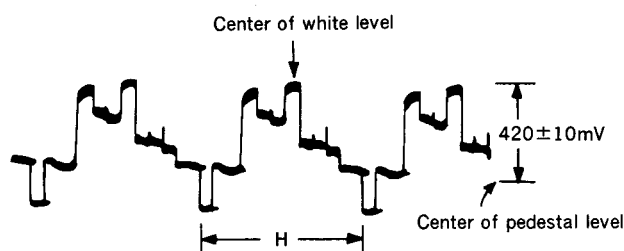


Fig. 9-20.

9-3-14. Y Level Adjustment (VC-106 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin ⑧(CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	0E (Y LEVEL)
Specified value	$330 \pm 5\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 0E with the adjustment remote control.
- 4) Change the adjustment data to adjust the Y level to $330 \pm 5\text{mV}$ with the adjustment remote control.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

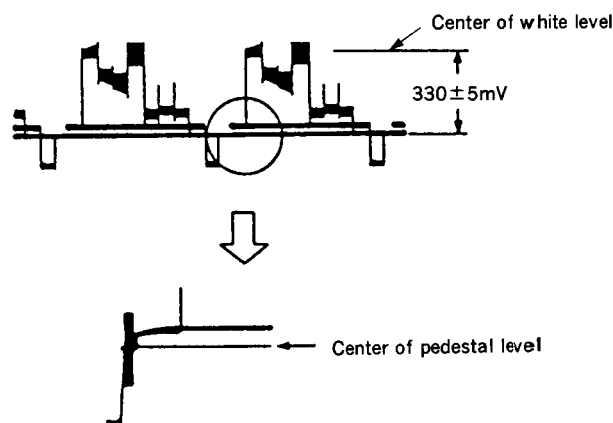


Fig. 9-21.

9-3-15. Max Gain Adjustment (VC-106 Board)

Object	Color bar chart standard picture frame
Filter	ND filter 2.9 (1.0+1.0+0.4+0.4+0.1)
Measurement point	Checkpoint array pin ⑧(CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	18 (MAX GAIN)
Specified value	$125 \pm 5\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Cover the lens with the ND filter 2.9 (1.0+1.0+0.4+0.4+0.1).
- 3) Select adjustment page F with the adjustment remote control.
- 4) Select adjustment address 18 with the adjustment remote control.
- 5) Change the adjustment data to adjust the level to $125 \pm 5\text{mV}$ with the adjustment remote control.
- 6) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 7) After this adjustment, remove the ND filter 2.9.

Note : The ND filter 2.9 is prepared by combining four filters. However, if the ND filter 2.9 is prepared by combining your four or less filters, use your filter combination.

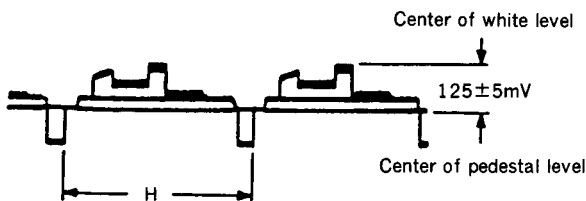


Fig. 9-22.

9-3-16. H Aperture Adjustment (VC-106 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin ⑧(CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	0D (SHP LEVEL)
Specified value	$40 \pm 5\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Turn the FOCUS RING until the aperture level (waveform peak) is maximized.
- 4) Select adjustment address 0D with the adjustment remote control.
- 5) Change the adjustment data with the adjustment remote control and set the lower peak between "green" and "white" levels to a point $40 \pm 5\text{mV}$ from the pedestal level.
- 6) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

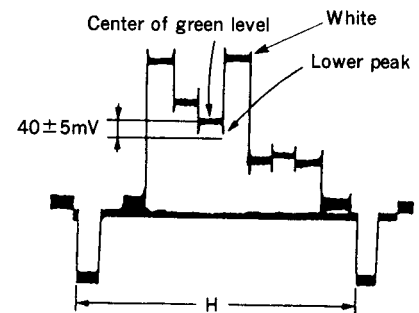


Fig. 9-23.

9-3-17. Burst Level Adjustment (VC-106 Board)

Object	All black (Cover the lens with a black cap.)
Measurement point	Checkpoint array pin $\textcircled{\text{A19}}$ (CAM C)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	17 (BURST LEVEL)
Specified value	$150 \pm 5 \text{mVp-p}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 17 with the adjustment remote control.
- 4) Change the adjustment data to adjust the burst level to $150 \pm 5 \text{mVp-p}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

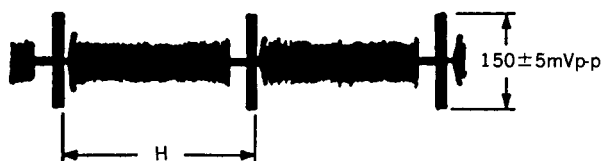


Fig. 9-24.

9-3-18. Pre-white Balance Adjustment

Object	All white standard picture frame
Measurement point	VIDEO OUT terminal of the video block
Measuring instrument	Vectorscope
Adjustment page	F
Adjustment address	05 (R GAIN) 04 (B GAIN)
Specified value	The center of a white bright point must be within a circle of 1mm diameter which is centered at the origin.

[Adjustment Method]

- 1) Maximize the gain of a vectorscope.
- 2) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 3) Select adjustment page F with the adjustment remote control.
- 4) Select adjustment address 05 with the adjustment remote control.
- 5) Change the adjustment data with the adjustment remote control to allow the white bright point to coincide with the origin.
Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Select adjustment address 04.
- 7) Change the adjustment data with the adjustment remote control to allow the white bright point to coincide with the origin.
Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 8) Repeat Steps 4) to 7).
- 9) Return the gain of the vectorscope to CAL and make sure that the center of the bright point is within a circle of 1 mm diameter which is centered at the origin.
- 10) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

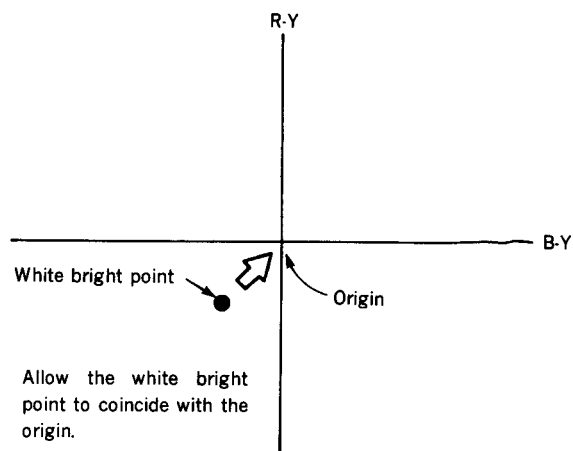


Fig. 9-25.

9-3-19. Color Reproducibility Adjustment

Object	Color bar chart standard picture frame
Measurement point	VIDEO OUT terminal of the video block
Measuring instrument	Vectorscope
Adjustment page	F
Adjustment address	09 (R-Y GAIN) 0A (B-Y GAIN) 0B (R-Y HUE) 0C (B-Y HUE)
Specified value	Every color bright point must be within the color reproduction frame.

Note : This adjustment assumes that both "Burst Level Adjustment" and "Pre-White Balance Adjustmet" have been previously completed.

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Change the adjustment data for each adjustment address with the adjustment remote control to allow every color bright point to fall within the specified color reproduction frame.
- 4) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

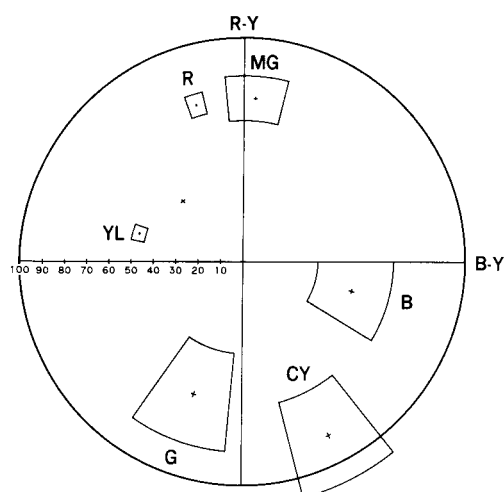


Fig. 9-26.

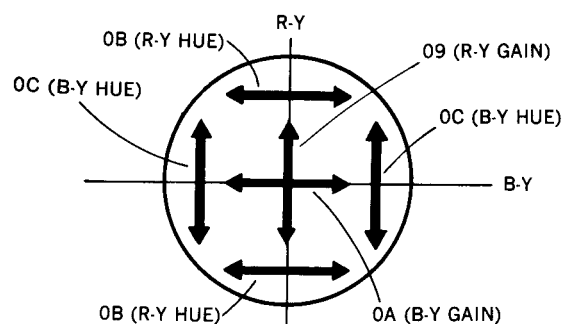


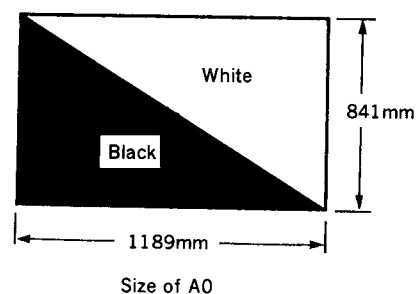
Fig. 9-27. Adjustment Address and Directions of Bright Point Movements

9-3-20. Flange Back Adjustment and Check

(1) Flange Back Adjustment

Object	See Fig. 9-28.
Measurement point	AF microcomputer data reader jig Adjustment remote control
Measuring instrument	
Adjustment page	F
Adjustment address	EB (MODE) E9 (ADJUST MODE)
Specified value	The adjustment remote control must indicate adjustment address 3B.

Note : The following object should be used (A0 size 1189×841mm)



The border between black and white parts should be sharp. Also, there should be no background except for this chart at the extreme end of WIDE.

Fig. 9-28.

[Adjustment Method]

- 1) Place the specified object in the center of the screen 2 meters $\pm$ 5mm apart from the front of the lens.
- 2) Make sure that the change between white and black is not deviated from the center of the screen even at the extreme end of TELE.
- 3) Press the SHUTTER SPEED button and set the speed to 1/120 shutter.
- 4) Select adjustment page 5, adjustment address 00 and adjustment data F0 with the adjustment remote control.
- 5) Select adjustment page F, adjustment address EB and adjustment data F9 with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Attach an appropriate ND filter on the whole lens depending on the quantity of light so that the indicated value of AF microcomputer reader jig is A0 or less.
- 7) Select adjustment address EB and adjustment data 22 with the adjustment remote control.
- 8) Set to adjustment address E9 and adjustment data 0F with the adjustment remote control. (This permits automatic adjustment.)
- 9) After this setting, check that 3B will be displayed at adjustment address on the adjustment remote control for 12 to 18 seconds.
- 10) After this check, remove the ND filter on the lens.
- 11) Select adjustment address EB and adjustment data 00 with the adjustment remote control.
- 12) Select adjustment address E9 and adjustment data 00 with the adjustment remote control.
- 13) Turn the main power OFF.

(2) Flange Back Check

Object	Siemens star chart
Measurement point	VIDEO OUT terminal of the video block
Measuring instrument	Monitor
Specified value	The siemens star must be in focus during zooming. In case of NG : Step difference $\pm$ 3 steps max

[Checking Method]

- 1) Place siemens star chart 2m apart from the front of the lens.
- 2) Select adjustment page 5, adjustment address 00 and adjustment data 10 with the adjustment remote control.
- 3) Open the IRIS.
- 4) Press the FOCUS button and set to Manual.
- 5) Pick up the image of the siemens star at the extreme end of TELE.
- 6) Turn the FOCUS RING to focus on the center position.
- 7) Check that the siemens star chart is in focus when zooming to the extreme end of WIDE. If NG, perform Steps 8) to 11) given below.
- 8) If NG, memorize the focus steps at the extreme end of WIDE.
- 9) Pick up image at the extreme end of WIDE.
- 10) Turn the FOCUS RING to focus on the center position.
- 11) Check that the focus steps observed at this time are different from the steps memorized above within $\pm$ 3 steps.
- 12) After this check, select adjustment page F and adjustment address 56 with the adjustment remote control and check that the adjustment data is 00. If the adjustment data is not 00, set the data to 00. Then, press the PAUSE button on the adjustment remote control to store the adjustment data.

9-3-21. Hall Adjustment (VC-106 Board)

Object	White patter standard frame All black (Put a black cap on the lens.)
Measurement point	CN251
Measuring instrument	AF microcomputer data reader jig
Adjustment page	F
Adjustment address	1B (HALL GAIN) 1C (HALL OFFEST)
Specified value	White pattern imaging : $B8 \pm 02$ All black imaging : 03 ± 03 (However, 00 is considered NG.)

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select the adjustment page F with the adjustment remote control.
- 3) Set the adjustment address to EB and the adjustment data to 05 with the adjustment remote control.
- 4) Press the PAUSE button on the adjustment remote control.
- 5) Set the adjustment address to 1B with the adjustment remote control.
Pick up the image of all white pattern in the zoom position of color bar standard frame. Change the adjustment data and adjust so that the indicated value of AF microcomputer reader jig is $B8 \pm 02$. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
Put a black cap on the lens and select all black imaging. Change the adjustment data and adjust so that the indicated value of AF microcomputer reader jig is 03 ± 03 (however, 00 is considered NG). Press the PAUSE button on the adjustment remote control to store the adjustment data.
- 6) Set the adjustment address to 1C with the adjustment remote control.
Pick up the image of all white pattern in the zoom position of color bar standard frame. Change the adjustment data and adjust so that the indicated value of the AF microcomputer reader jig is $B8 \pm 02$. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
Put a black cap on the lens and select all black imaging. Change the adjustment data and adjust so that the indicated value of AF microcomputer reader jig is 03 ± 03 (however, 00 is considered NG). Press the PAUSE button on the adjustment remote control to store the adjustment data.
- 7) Repeat Steps 5) and 6) alternately until the specification is met.
- 8) Set the adjustment address to EB and the adjustment data to 00 with the adjustment remote control.
- 9) Press the PAUSE button on the adjustment remote control to store the adjustment data.

9-3-22. Auto White Balance Adjustment (VC-106 Board)

Note 1 : "Preset Adjustment" and "Auto White Balance Adjustment" should be always performed in this order.

1) Preset Adjustment (VC-106 Board)

Object	All white pattern
Adjustment page	F
Adjustment address	EE (AWB MODE1)

Note 1 : Allow the set to be energized for more than 30 seconds before entering Preset Adjustment.

Note 2 : When making "Preset Adjustment" again, turn the power OFF once and then ON again before retry.

[Adjustment Method]

- 1) Turn the power OFF once and then ON again.
- 2) Pick up the image of all white pattern for more than 5 seconds. (AF switch should be turned OFF.)
- 3) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 4) Select adjustment page F with the adjustment remote control.
- 5) Set the adjustment address to EE and the adjustment data to 01 with the adjustment remote control.
- 6) Press the PAUSE button on the adjustment remote control (3200K Data Fetch 1).
- 7) Set the adjustment address to EE and the adjustment data to 01 with the adjustment remote control.
- 8) Press the PAUSE button on the adjustment remote control (3200K Data Fetch 2).
- 9) Check that the LANC data is changed and that adjustment address 95 is selected.
- 10) Set the adjustment address to EE and the adjustment data to 00 with the adjustment remote control.
- 11) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 12) Perform "Auto White Balance Adjustment."

(2) Auto White Balance Adjustment (VC-106 Board)

Note 1 : This adjustment assumes that "Preset Adjustment" has been previously completed.

Object	All white pattern
Filter	Color temperature compensation filter C14 (C12 + C2)
Measuring instrument	Vectorscope
Measurement point	VIDEO OUT terminal
Adjustment page	F
Adjustment address	01 (R CONT) 02 (B CONT)
Specified value	The white bright point must coincide with the origin.

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Cover the lens with the C14 filter.
- 3) Select adjustment page F with the adjustment remote control.
- 4) Select adjustment address EE (AWB MODE1) and set the adjustment data to D0 (WB DIRECT setting) with the adjustment remote control. Press the PAUSE button adjustment remote control in order to store the adjustment data.
- 5) Change the adjustment data at adjustment addresses 01 and 02 and adjust so that the white bright point coincides with the origin. Press the PAUSE button on the adjustment remote control to store the adjustment data,
- 6) Select adjustment address EE and set the adjustment data to 00.
- 7) Press the PAUSE button on the adjustment remote control to store the adjustment data.

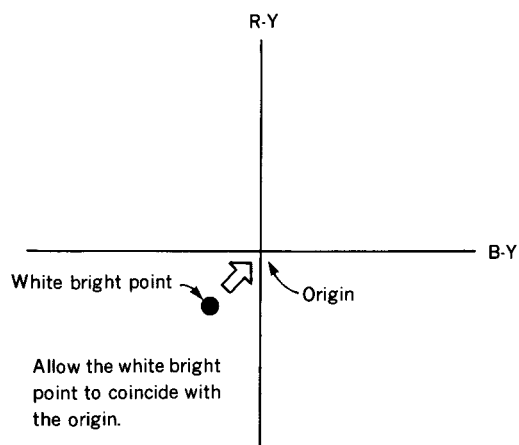


Fig. 9-29.

9-3-23. Manual Gain Reference Setting (VC-106 Board)

Object	Color bar chart standard picture frame
Measurement point	CN251
Measuring instrument	AF microcomputer data reader jig
Adjustment page	F
Adjustment address	64 (GAIN REF)

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address EB and adjustment data 0B with the adjustment remote control.
- 4) At this time, input the indicated value of AF microcomputer reader jig to at address 64. Press the PAUSE button in order to store the adjustment data.
- 5) Select adjustment address EB and adjustment data 00.
- 6) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

9-3-24. Manual Iris Data Adjustment (VC-106 Board)

Object	White pattern standard picture frame
Measurement point	CN251
Measuring instrument	AF microcomputer data reader jig
Adjustment page	F
Adjustment address	63 (M IRIS REF)
Specified value	$B8 \pm 02$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address EB and adjustment data 05 with the adjustment remote control.
- 4) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 5) Open the AUTO LOCK cover.
- 6) Press the EXPOSURE button and set to Brightness mode.
Use the EXPOSURE control dial to set to the 6th position from the bottom. (The first position is to be selected when the Iris is closed.)
- 7) Change the adjustment data at adjustment address 63 and adjust so that the indicated value of AF microcomputer reader jig is $B8 \pm 02$. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 8) Select adjustment address EB and adjustment data 00.
- 9) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

9-3-25. Outdoor White Balance Check

Object	All white pattern standard frame
Filter	Color temperature compensation filter C14 (C12+C2)
Measurement point	VIDEO OUT terminal of the video block
Measuring instrument	Vectorscope
Specified value	See Fig. 9-30.

[Checking Method]

- 1) Press the WHITE BALANCE button and set to Outdoor White Balance mode.
(The mark  will appear on the EVF screen or monitor screen (when the data screen is turned ON.).)
- 2) Check that the center of the white bright point is within the circle of 3.5mm diameter given in Fig. 9-30.

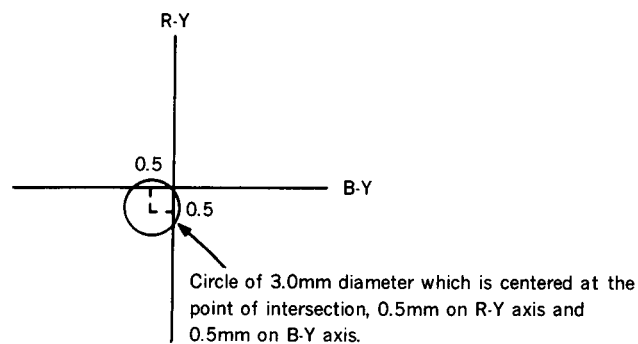


Fig. 9-30.

9-3-26. Auto Focus Check (VC-106 Board)

Object	Color bar chart standard picture frame
Measurement point	CN251
Measuring instrument	AF microcomputer reader jig
Adjustment page	F
Adjustment address	EB (MODE) 5D (JIG 1 PAGE) 40 (JIG 0)
Specified value	FA > 60 FA/FH = 3 or 4

[Checking Method]

- 1) Press the FOCUS button and turn the Auto Focus ON.
- 2) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 3) Select adjustment page F, adjustment address EB and adjustment data F9 with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Check that the indicated value (FA) of AF microcomputer reader jig is more than 60 (FA > 60).
- 5) After this check, set the adjustment data at adjustment address EB to 21. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Select adjustment address 5D and adjustment data 00 with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 7) Select adjustment address 40 and adjustment data D4 with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 8) Check that the indicated value (FA/FH) of AF microcomputer reader jig is 3 or 4 (FA/FH = 3 or 4).
- 9) After this check, set to adjustment address EB and adjustment data 00.
- 10) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

9-3-27. Brightness Correction Check (VC-106 Board)

Object	All white pattern All black (Cover the lens with a black cap.)
Measurement point	CN251
Measuring instrument	AF microcomputer reader jig
Adjustment page	F
Adjustment address	EB (MODE)
Specified value	All white and all black : $B8 \pm 03$ Resetting : 04 ± 03

[Checking Method]

- 1) Take a picture of all white pattern and set the EXPOSURE button to ON.
- 2) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 3) Select adjustment page F, adjustment address EB and adjustment data 05 with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Check that the indicated value of AF microcomputer reader jig is $B8 \pm 03$.
- 5) Make all black imaging (Cover the lens with a black cap).
- 6) Check that the indicated value of AF microcomputer reader jig is still $B8 \pm 03$.
- 7) Set the EXPOSURE button to OFF and then to ON again.
- 8) Check that the indicated value of AF microcomputer reader jig is 04 ± 03 . Also, check that the EVF brightness indication is at the top.
- 9) Set to adjustment address EB and adjustment data 00 with the adjustment remote control.
- 10) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

9-3-28. Digital Titler Picture Quality Check

Mode	Camera Stand-by
Object	All black (Cover the lens with a black cap.)
Measurement point	VIDEO OUT terminal
Measuring instrument	Vectorscope
Specified value	Mg (Magenta) must be within the specified frame. (Check that each of the other colors is within the specified frame.)

[Checking Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 10 with the adjustment remote control.
- 2) Make all black imaging (Cover the lens with a black cap).
- 3) Press the MEMORY button.
- 4) Press the SUPERIMPOSE ON/OFF button to display the title.
- 5) Press the COLOR/MODE button to select Mg (Magenta).
- 6) At this time, check that Magenta is within the specified frame.
- 7) Check that each of the other colors is within the specified frame.

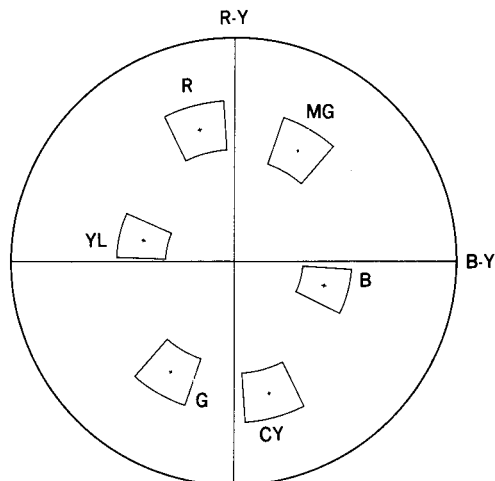


Fig. 9-31.

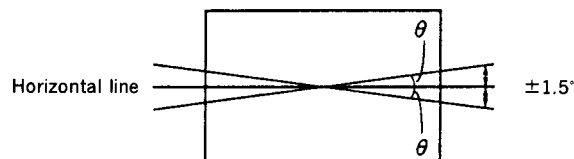
9-4. ELECTRONIC VIEWFINDER SYSTEM ADJUSTMENTS

9-4-1. Horizontal Tilt Adjustment

Mode	Playback
Signal	Alignment tape for checking operation (WR5-5CSP) Monoscope portion
Specified value	See Fig. 9-32

[Adjustment Method]

- 1) Adjust optimum brightness on the CRT with RV954 (BRIGHT).
- 2) Loosen the DY (deflection yoke) tightening nut.
- 3) Make the picture horizontal by rotating DY.
- 4) Retighten the DY tightening nut.
(Do not tighten excessively.)



Specified value: Image orientation to be within $\pm 1.5^\circ$ of horizontal line.

Fig. 9-32.

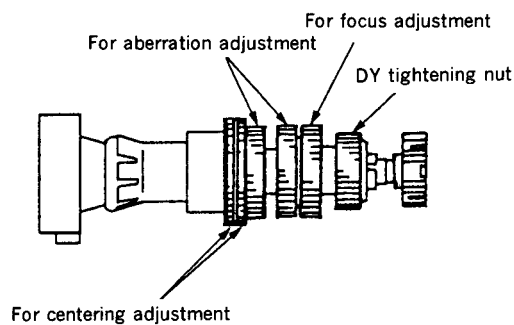


Fig. 9-33.

9-4-2. Centering Adjustment

Mode	Playback
Signal	Alignment tape for checking operation (WR5-5CSP) Monoscope portion
Specified value	See Fig. 9-34.

[Adjustment Method]

- 1) Turn the centering adjustment rings to make the margin even at right, left, upper and lower of the screen.
(See Fig. 9-33.)

Note : Since the centering position is affected by the earth magnetism, turn the equipment over 360° horizontally, and make adjustment at the orientation that exhibits median displacements of the image.

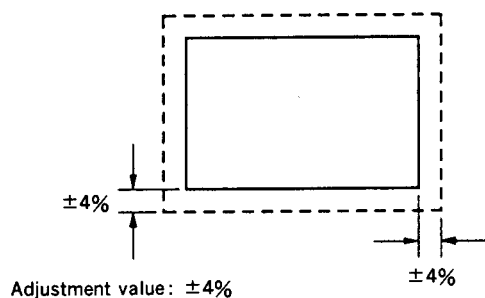


Fig. 9-34.

9-4-3. Focus Adjustment

Mode	Playback
Signal	Alignment tape for checking operation (WR5-5CSP) Monoscope portion

[Adjustment Method]

- 1) Adjust for optimum focus using the focus ring.
(See Fig. 9-33.)

9-4-4. Aberration Adjustment

Mode	E-E
Signal	Dot pattern
Specified value	See Fig. 9-35.

[Adjustment Method]

- 1) Use the aberration adjustment rings to adjust any trailing dots to under 2 times the dot diameter and any fan shaped aberrations to within the dot diameter.
- 2) If off center, repeat the "Centering Adjustment".

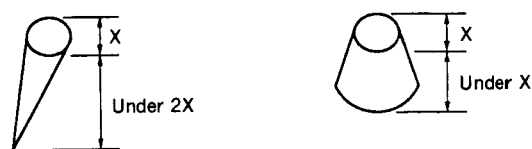


Fig. 9-35.

9-4-5. Horizontal Oscillation Frequency Adjustment (VF-40P Board)

Mode	Playback
Signal	Alignment tape for checking operation (WR5-5CSP)
Measurement point	Positive terminal of C954
Measuring instrument	Digital voltmeter or oscilloscope (DC range)
Adjustment element	RV951
Specified value	$2.60 \pm 0.05 \text{ Vdc}$

[Adjustment Method]

- 1) Adjust RV951 to $2.60 \pm 0.05 \text{ Vdc}$.

9-4-6. Horizontal Amplitude Adjustment (VF-40P Board)

Mode	Playback
Signal	Alignment tape for checking operation (WR5-5CSP) Monoscope portion
Adjustment element	C961
Specified value	$6 \pm 2\%$

[Adjustment Method]

- 1) By turning RV952, align upper and lower edges of the monoscope image with those of the screen.
- 2) By turning RV954, attain a normal brightness level.
- 3) To achieve $6 \pm 2\%$ horizontal overscans (right and left total), short-circuit or open the pattern (A) for H size adjustment capacitor (C961). (See Fig. 9-37.)

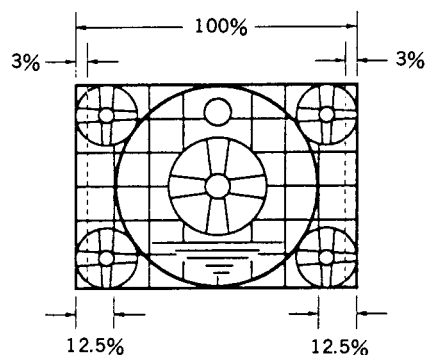
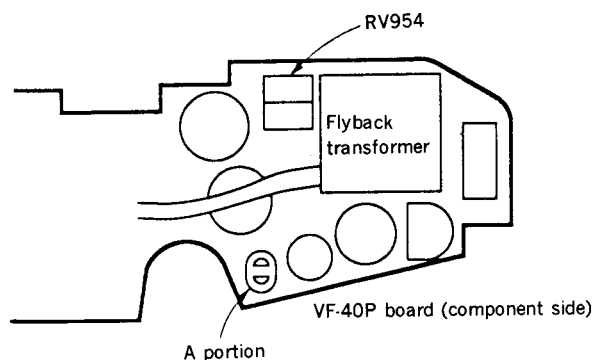


Fig. 9-36.



A section	H size
Open	Small
Short	Large

Fig. 9-37.

9-4-7. Vertical Amplitude Adjustment (VF-40P Board)

Mode	Playback
Signal	Alignment tape for checking operation (WR5-5CSP) Monoscope portion
Adjustment element	RV952
Specified value	$5 \pm 2\%$

[Adjustment Method]

- 1) By turning RV952, adjust for $5 \pm 2\%$ (upper and lower total) vertical overscan.

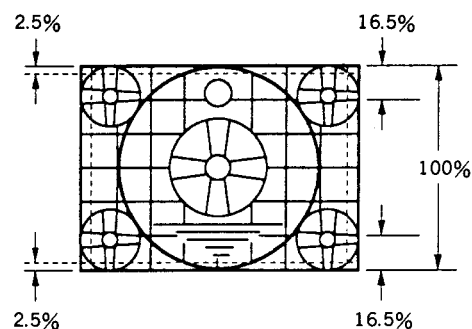


Fig. 9-38.

9-4-8. Brightness, Contrast Adjustments (VF-40P Board)

Mode	Playback
Signal	Alignment tape for checking operation (WR5-5CSP) Monoscope portion
Adjustment element	Brightness: RV954 Contrast: RV953

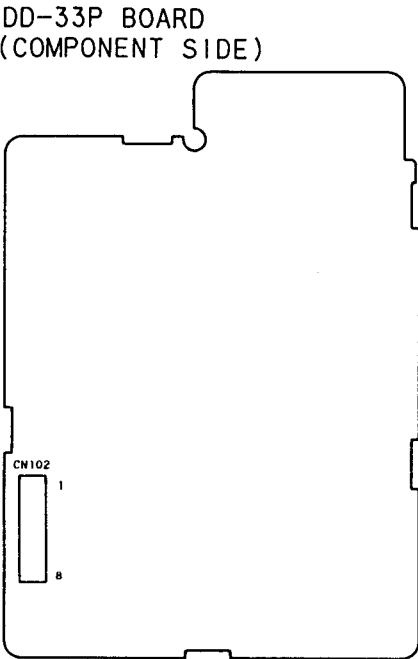
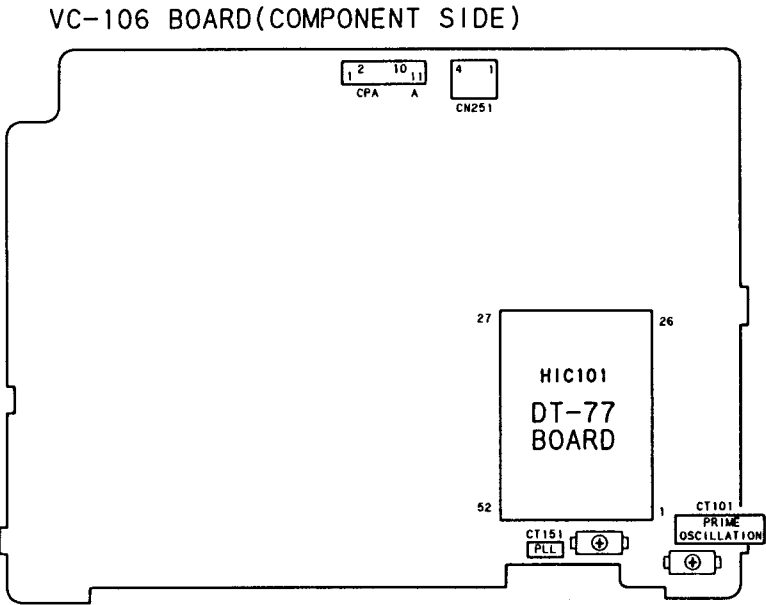
[Adjustment Method]

- 1) Turn RV954 and RV953 alternately until the bright and dark areas of a gray scale are displayed correctly. (The bright areas should not be made too bright to avoid a fuzzy display of the cross-hatches in the monoscope circle, and the brightness of the dark areas should be such that discrimination between the darkest and second darkest area is possible.)

9-4-9. Horizontal Amplitude, Vertical Amplitude and Focus Checks

Values should conform to specifications given in "9-4-6. Horizontal Amplitude Adjustment" and "9-4-7. Vertical Amplitude Adjustment". If not, readjust accordingly, and repeat "9-4-8. Brightness, Contrast Adjustments". In this case, focus needs to be checked. If the image is not clear, perform "9-4-3. Focus Adjustment" and "9-4-4. Aberration Adjustment".

9-5. ADJUSTING PART LOCATION DIAGRAM



SECTION 10

VIDEO SYSTEM ADJUSTMENTS

See the adjusting part location diagram from on page 282 for the adjustment

10-1. PREPARATION FOR ADJUSTMENT

10-1-1. Equipment Required

The following measuring instruments are used for adjustment of the VTR block.

- 1) Monitor TV
- 2) Dual-trace oscilloscope, band width of 30MHz or more, with delay mode (use a probe 10: 1, unless otherwise specified)
- 3) Frequency counter
- 4) Pattern generator (with video output terminal; refer to 5-1-3 "Equipment Connection")
- 5) Digital voltmeter
- 6) Audio generator
- 7) Audio level meter
- 8) Audio distortion meter
- 9) Audio attenuator
- 10) Stabilized power supply
- 11) Alignment tape
 - For tracking adjustment
(WR5-1CP) Part No.: 8-967-995-07
 - For video frequency characteristic adjustment
(WR5-7CE) Part No.: 8-967-995-18
 - For L mode operation check
 - For SP (WR5-5CSP) Part No.: 8-967-995-46
 - (WR5-4CSP) Part No.: 8-967-995-47
 - For LP (WR5-4CL) Part No.: 8-967-995-56
 - For E mode operation check (ME tape)
 - For SP (WR5-8CSE) Part No.: 8-967-995-48
 - For LP (WR5-8CLE) Part No.: 8-967-995-57
 - For audio adjustment
(WR5-9CS) Part No.: 8-967-995-28

10-1-2. Precautions for Adjustment

"Playback Frequency Characteristic Adjustment" of the Video System Adjustment should be always performed with the VC-106 board removed. When removing the VC-106 board, the following three flexible harnesses (four connectors) should be removed.

1. FP-379 Flexible (Two connectors)
2. FP-380 Flexible
3. FP-383 Flexible

The VC-106 board should be installed for performing the other adjustments for the VTR block.

10-1-3. Equipment Connection

Connect the measuring instruments as shown in Fig. 10-1 in accordance with indication of an input terminal (S VIDEO or VIDEO), and shift the CAMERA/VTR switch to VTR to make adjustment. The input terminal is specified in parentheses at the signal blank. When not specified, either input terminal may be used. The S VIDEO IN terminal has priority. When making adjustment with VIDEO IN terminal input, pull out a connector from the S VIDEO IN terminal.

Note 1 : When VIDEO input is used for adjustment where S VIDEO input is specified, the specifications of this equipment may not be satisfied. Be sure to follow instructions.

Note 2 : When adjustment is made using the VTR with S VIDEO output terminal as a signal source, the performance of this equipment is affected by that VTR. Use the pattern generator with Y/C separator output terminal as much as possible.

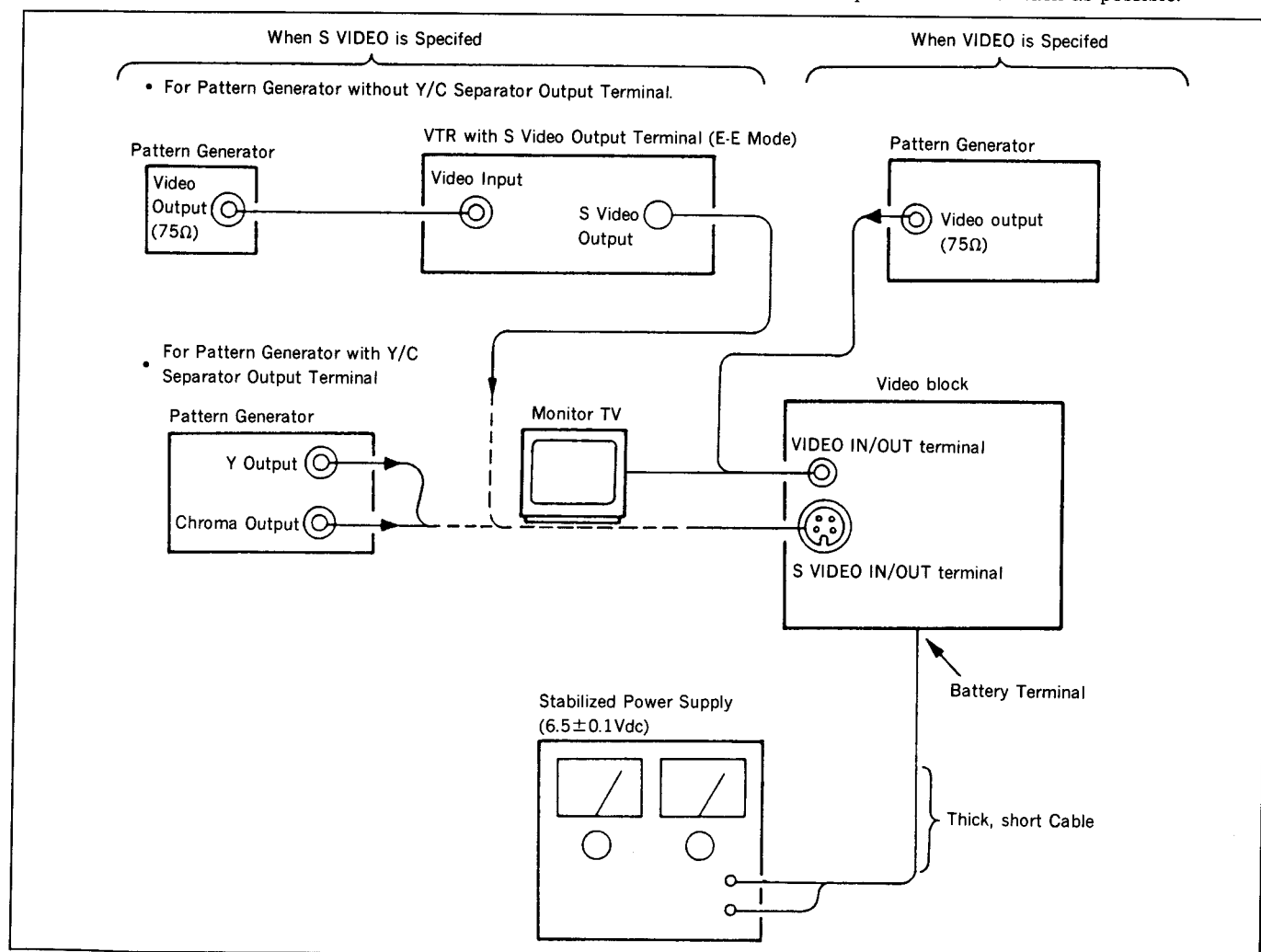


Fig. 10-1

10-1-4. Input Signal Check

Video signals from the pattern generator are used as adjustment signals for adjustment of the VTR block. These video output signals should be within the required standard.

1) For S VIDEO input

Connect an oscilloscope to the Y signal terminal of the S VIDEO IN terminal and check that a Y signal sync. signal has an amplitude of about 0.3 Vp-p, and an image amplitude is about 0.7 Vp-p. (When the VTR with S VIDEO OUT terminal is used, check also that neither chroma signal nor burst signal is remaining.) Also, connect the oscilloscope to the chroma signal terminal of the S VIDEO IN terminal and check that the burst signal for the chroma signal has a flat amplitude of about 0.3 Vp-p, and that a burst signal vs. chroma signal amplitude ratio is 0.30 : 0.66. Fig. 10-2 shows the Y and chroma signals used for adjustment.

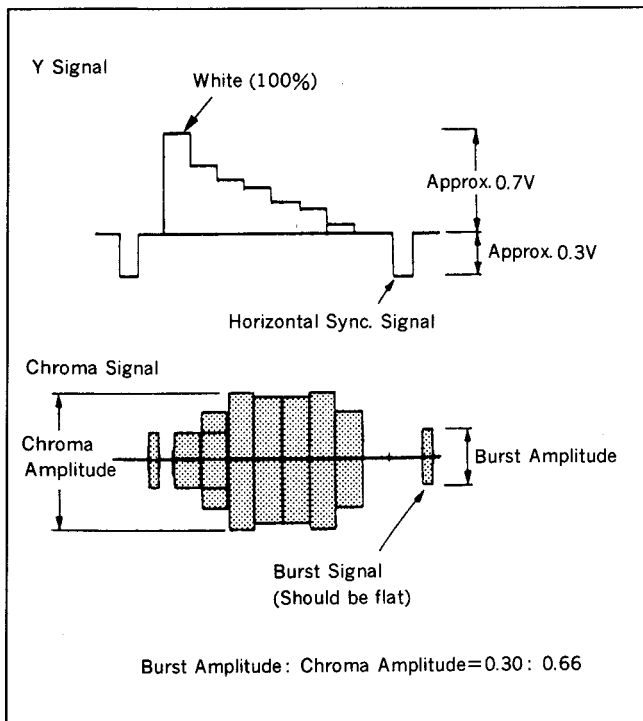


Fig. 10-2. Pattern Generator Color Bar Signals

2) For VIDEO input

Connect the oscilloscope to the VIDEO IN terminal and check that a video signal sync. signal amplitude is approx. 0.3V, image amplitude approx. 0.7V, and burst signal amplitude approx. 0.3V and flat, respectively, and that a burst signal vs. "red" signal level ratio is 0.30 : 0.66.

The video signal (color bar) used for the VTR block adjustment is shown in Fig. 10-3.

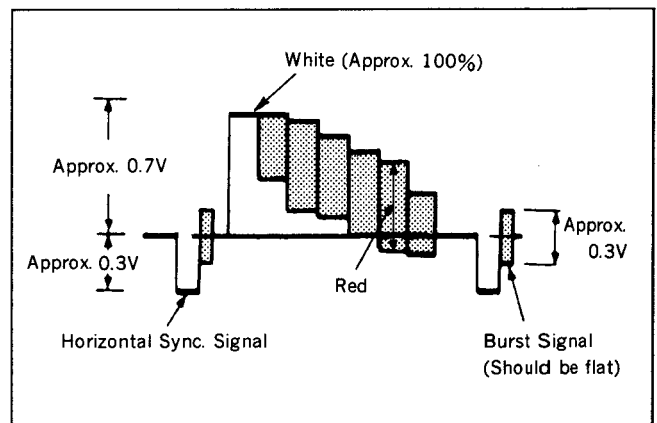


Fig. 10-3. Pattern Generator Color Bar Signal

10-1-5. Alignment Tape

The following alignment tapes are provided. Use the alignment tape specified in the signal blank for each adjustment.

When using the operation checking tape for adjustment and no type is specified, you can use any operation checking tape.

Tape	Recording Mode	Tape Type	Tape Speed	Recording content		Use
				Video Area	PCM Area (Audio)	
Tracking WR5-1CP	L	MP	SP	CH2 : 1 MHz tape path adjustment signal, Switching position adjustment marker (CH1 : 9MHz)		Tape path adjustment, Switching position adjustment
Video frequency characteristic WR5-7CE	E	ME	LP	RF sweep 0~15MHz Marker 2, 4.5, 7.8.5, 10MHz		Frequency characteristic adjustment
Operation checking WR5-4CSP or WR5-5CSP	L	MP	SP	- Video signal Color bar : 4min. Monoscope : 4min. - Audio signal (AFM) 400Hz, 60% modulation	Monoscope portion 20Hz, 20sec. 400Hz, 20sec. } Repeat 4 times 14kHz, 20sec. Color bar portion 1kHz, 4min.	Operation checking
WR5-8CSE	E	ME	SP		400Hz, 8min	
WR5-4CL	L	MP	LP	- Video signal Color bar : 4 min. Monoscope : 4 min. - Audio signal (AFM) 400Hz 60% modulation		
WR5-3CL	L	MP	LP	- Video signal Color bar : 4min. Monoscope : 4min. - Audio signal (AFM) 400Hz, 60% modulation		
WR5-8CLE	E	ME	LP		400Hz, 8min	
AFM stereo checking operation WR5-9CS	L	MP	SP	- Video signal Color bar : 4 min. 400Hz 8min. - Audio signal (AFM) - Color bar part Lch : 400Hz L+R (1.5MHz±60kHz) Rch : 1kHz L-R (1.7MHz±30kHz) - Monoscope part DEV+Bilingual (Including a RF ID signal.)	Audio signal (PCM) 400Hz 8min.	AFM stereo PB matrix adjustment

Note : Recording modes

L Conventional mode
E hi8 (high band) mode

Tape types

MP Coated metal tape
ME Evaporated metal tape

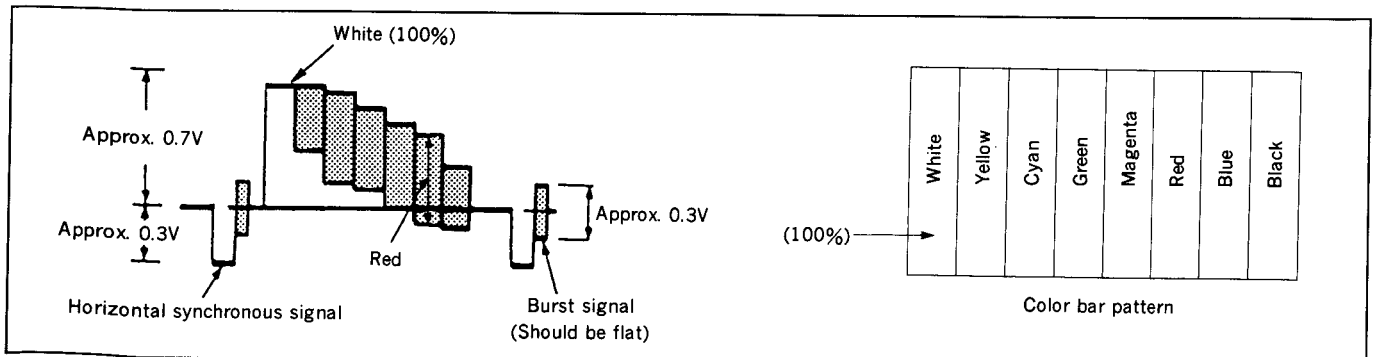


Fig 10-4. Alignment Tape Color Bar Signal

10-1-6. Input/Output Level and Impedance

S video input/output

4-pin mini DIN

Luminance signal : 1 Vp-p, 75

ohms, unbalanced,

sync negative

Chrominance signal : 0.300 Vp-p, 75

ohms, unbalanced,

Video input/output

Phono jack, 1 Vp-p, 75 ohms,

unbalanced, sync negative

Audio input/output

Phono jacks, (2 : stereo L and R)

Input : -7.5 dBs, input impedance
more than 47 kilohms

Output : -7.5 dBs, (at output
impedance 47 kilohms) impedance
less than 2.2 kilohms

10-1-7. Recording Mode (E Mode/L Mode) Changeover

The recording mode (E mode/L mode) of this unit is changed over as listed below. Note that the playback mode (E mode/L mode) is automatically changed over depending on the recording mode for the tape to be played back.

Hi8 switch (L mode/E mode changeover switch)	Tape used	Record mode
AUTO (E mode)	ME	E
	MPHG	
	MP	L
OFF (L mode)	ME	L
	MPHG	
	MP	

(The recording mode only depends on the position of the Hi8 switch and the tape used.)

(VTR Recording Procedure for AEP, UK Model)

1. Insert the adjustment remote control RM-95 (J-6082-053-B) into the REMOTE jack.
2. Set the adjustment remote control to HOLD ON.
3. Select adjustment page 4, adjustment address C1 and adjustment data 41, and select adjustment page 4, adjustment address 29 and adjustment data 6 with the adjustment remote control. (When the power is turned OFF, the system will return to the original state.)
4. Select adjustment page 0, adjustment address 01 and adjustment data 01 with the adjustment remote control.
5. Select adjustment page D, adjustment address 05 and adjustment data 91 with the adjustment remote control.
6. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
7. Set the adjustment remote control to HOLD OFF.
(Now, VTR recording can be started.)

Note 1 : After recording has been done, be sure to turn the power OFF and then ON again to play back the record.

Note 2 : To clear REC mode, perform the above items 1, 2, 4, 5, 6 and 8. In this procedure, the adjustment data for item 6 should be set to 90.

Note 3 : When the data on page 4 has been changed, the SP/LP changeover and other switches will not be in force. Therefore, switch to a necessary mode before setting up necessary data.

10-2. POWER SUPPLY ADJUSTMENT AND CHECK

[Adjustment Sequence]

- 10-2-1. Frequency Adjustment
- 10-2-2. Video 5V Adjustment
- 10-2-3. Output Voltage Check

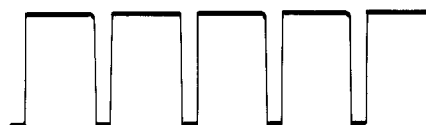
10-2-1. Frequency Adjustment (DD-33P Board)

Mode	Record
Signal	Arbitrary
Measurement point	Q201 collector (JL202)
Measuring instrument	Oscilloscope Frequency counter
Adjustment element	RV101
Specified value	$475 \pm 5\text{kHz}$

Note : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Adjustment Method]

- 1) Adjust RV101 to obtain the level $475 \pm 5\text{kHz}$.



$475 \pm 5\text{kHz}$

Fig. 10-5.

10-2-2. Video 5V Adjustment (DD-33P Board)

Mode	Record
Signal	Arbitrary
Measurement point	Positive (+) side : CN103 pin ③ Negative (−) side : CN103 pin ① (REG GND) (JL204)
Measuring instrument	Digital voltmeter
Adjustment element	RV102
Specified value	$4.92 \pm 0.01\text{Vdc}$

[Adjustment Method]

- 1) Adjust RV102 to obtain the level $4.92 \pm 0.01\text{Vdc}$.

10-2-3. Output Voltage Check (DD-33P Board)

Note : Pin ① of CN103 (REG GND) (JL204) should be used for grounding.

Mode	E-E
Measuring instrument	Digital voltmeter
SS 5V Check	
Measurement point	CN103 pin ⑦ (JL216)
Specified value	$4.91 \pm 0.03\text{Vdc}$
VIDEO 5V Check	
Measurement point	CN103 pin ③ (JL207)
Specified value	$4.92 \pm 0.02\text{Vdc}$
AUDIO 5V Check	
Measurement point	CN103 pin ⑥ (JL212)
Specified value	$4.89 \pm 0.03\text{Vdc}$
EVF 5V Check	
Measurement point	CN103 pin ④ (JL209)
Specified value	$4.95 \pm 0.03\text{Vdc}$
V_{EE} Check	
Measurement point	CN103 pin ⑤ (JL210)
Specified value	$-3.95 \pm 0.10\text{Vdc}$

[Checking Method]

- 1) Check that each of the power supply voltages meets its specified value.

10-3. SYSTEM CONTROL SYSTEM ADJUSTMENT

10-3-1. Battery Down Adjustment

Mode	CAMERA REC
Object	Arbitrary
Measurement point	Check on the LCD of the adjustment remote control.
Measuring instrument	
Adjustment page	D
Adjustment address	02

[Connection]

- 1) Connect a stabilized power supply and a digital voltmeter as shown in Fig. 5-6.

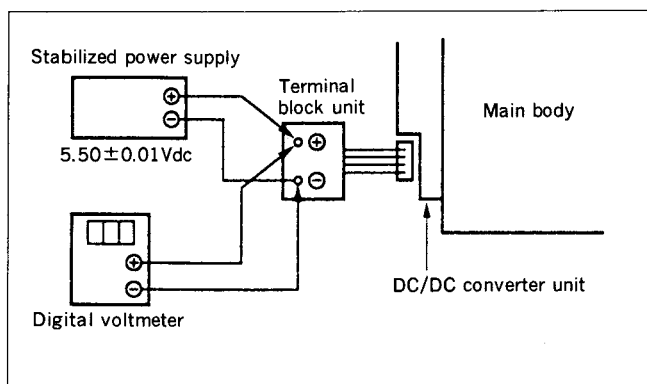


Fig. 10-6.

[Adjustment Method]

- 1) Connect the adjustment remote control to the REMOTE terminal (HL-4 board J501).
- 2) Place the POWER switch in the CAMERA position to set to CAMERA REC mode.
- 3) Place the HOLD switch on the adjustment remote control in the HOLD position (Service position).
- 4) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control (Emergency Inhibited and Protect Released). At this time, check that the voltage is 6.0Vdc or higher.
- 5) Set to adjustment address 02 with the remote control and make a note of the adjustment data (data A).
- 6) Select adjustment page D and adjustment address 02 with the remote control.
- 7) Input the data A noted in Step 5) into at adjustment address 02.
- 8) Press the PAUSE button on the remote control in order to store the adjustment data.

[Checking Method]

Perform the following checks. If any check is NG, perform the adjustment again.

- 1) Adjust the output voltage of the stabilized power supply so that the digital voltmeter indicates $5.65 \pm 0.01\text{Vdc}$. (The VTR is in CAMERA REC mode.)
- 2) Check that mark is not illuminating on the EVF (Viewfinder) screen. (The TALLY lamp is lit.)

- 3) Reduce the output voltage of the stabilized power supply to such a level that the digital voltmeter indicates $5.53 \pm 0.01\text{Vdc}$.
- 4) Check that mark and TALLY lamp on the EVF screen flashes at approximately 1 sec. intervals.
- 5) Reduce the output voltage of the stabilized power supply to such a level that the digital voltmeter indicates $5.47 \pm 0.01\text{Vdc}$.
- 6) Check that mark and TALLY lamp on the EVF screen flashes at more frequent intervals and that the VTR is stopped and that the power is turned OFF.

10-4. SERVO SYSTEM ADJUSTMENT

[Adjustment Sequence]

- 10-4-1. Capstan FG Frequency Check
- 10-4-2. Capstan FG Offset Adjustment
- 10-4-3. Switching Position Adjustment

10-4-1. Capstan FG Frequency Check (VS-87 Board)

Mode	Record (SP) Playback (LP)
Signal	Arbitrary
Measurement point	IC605 pin ⑤ (FG OUT) (JL734)
Measuring instrument	Frequency counter Oscilloscope
Specified value	SP mode : $1145.5 \pm 1.0\text{Hz}$ LP mode : $574.7 \pm 1\text{Hz}$

[Checking Method]

- 1) Set to Record mode. (SP mode)
- 2) Check that the capstan FG frequency is $1145.5 \pm 1.0\text{Hz}$.
- 3) Set to Stop mode.
- 4) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 5) Place the EDIT switch in the EDIT ON position.
- 6) Set to Playback mode. (LP mode)
- 7) Check that the capstan FG frequency is $574.7 \pm 1\text{Hz}$.
- 8) Select adjustment page 0 and adjustment address 00 and return the adjustment data to 00 with the adjustment remote control.

10-4-2. Capstan FG Offset Adjustment (VS-87 Board)

Mode	Record
Signal	Arbitrary
Measurement point	IC605 pin ②⑤ (FG OUT) (JL734)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	2B
Specified value	Duty $50 \pm 1\%$

[Adjustment Method]

- 1) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 2) Select adjustment page D and adjustment address 2B with the adjustment remote control.
- 3) Change the adjustment data with the adjustment remote control and adjust so that the CAP FG output waveform has a duty of $50 \pm 1\%$.
- 4) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

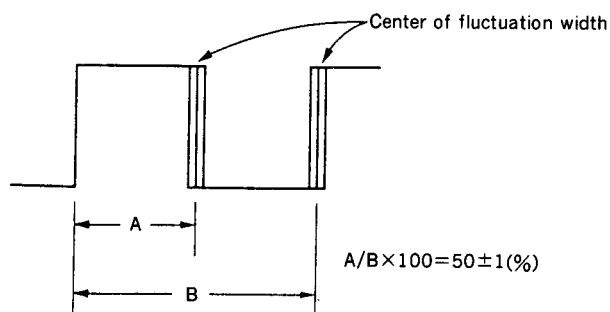


Fig. 10-7.

10-4-3. Switching Position Adjustment (VS-87 Board)

Mode	Playback
Signal	Alignment tape : for tracking adjustment (WR 5-1CP)
Measurement point	CH1 : CN002 pin ⑩ (RF SWP) CH2 : CN002 pin ⑪ (PB RF 2A) CN002 pin ⑫ (PB RF 2B)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	04
Specified value	$t_1 = 0 \pm 10 \mu\text{sec}$

[Adjustment Method]

- 1) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 2) Select adjustment page D and adjustment address 04 with the adjustment remote control.
- 3) Change the adjustment data with the adjustment remote control and adjust the waveform on CH2 so that $t_1 = 0 \pm 10 \mu\text{sec}$.
- 4) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

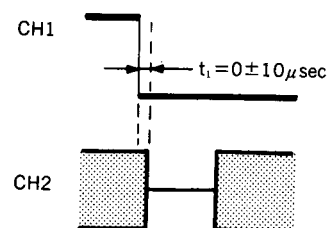


Fig. 10-8.

10-5. VIDEO SYSTEM ADJUSTMENT

It is expected that this Video System Adjustment be performed in the sequence that the adjustments are described. The color video signal supplied from the pattern generator is utilized as the video input signal for this Video System Adjustment in Record mode. Check that the signal meets the specifications given in Fig. 10-3 and in the "Input Signal Check".

[Adjustment Sequence]

- 10-5-1. Playback Frequency Characteristic Adjustment
- 10-5-2. X'tal Oscillator fo Check
- 10-5-3. SYNC AGC Adjustment
- 10-5-4. IR Adjustment
- 10-5-5. Chroma Comb Filter Adjustment (1)
- 10-5-6. Emphasis Input Level Adjustment
- 10-5-7. L Mode PB Y Level Adjustment
- 10-5-8. E Mode PB Y Level Adjustment
- 10-5-9. L Mode Y FM Deviation, Y FM Carrier Frequency Adjustment
- 10-5-10. E Mode Y FM Deviation, Y FM Carrier Frequency Adjustment
- 10-5-11. YD Adjustment
- 10-5-12. Chroma Emphasis Adjustment
- 10-5-13. Chroma Comb Filter Adjustment (2)
- 10-5-14. REC C RF Level Adjustment
- 10-5-15. Recording Current Adjustment
- 10-5-16. Y Level Adjustment
- 10-5-17. HUE Phase Deviation Adjustment
- 10-5-18. Titler PLL Adjustment
- 10-5-19. Character Generator Clock Adjustment

10-5-1. Playback Frequency Characteristic Adjustment (VS-87 Board)

Mode	Playback
Signal	Alignment tape : for frequency characteristic adjustment (WR5-7CE)
Measurement point	See Fig. 10-9.
Measuring instrument	Oscilloscope
Adjustment element	RV003 (1A) RV004 (1B) RV002 (2A) RV001 (2B)
Specified value	4.5MHz level : 8.5MHz level=3 : 2

Note : The VC-106 board should be removed for this adjustment.

[Adjustment Method]

- 1) Adjust the respective RV adjustment elements so that for 1A, 1B, 2A and 2B PB RF output waveforms, the ratio of the 4.5MHz level to the 8.5MHz is 3 : 2.

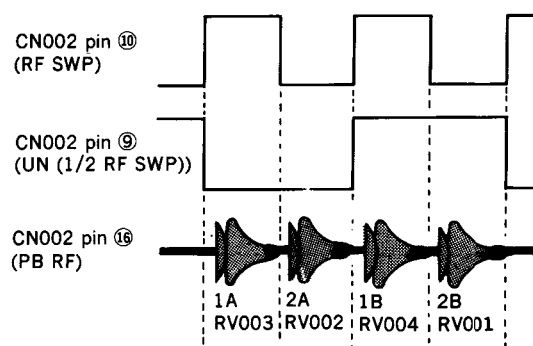


Fig. 10-9.

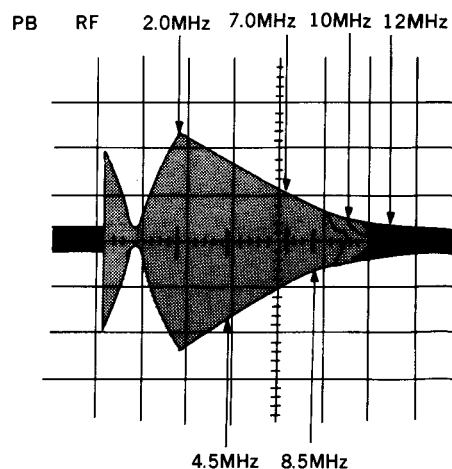


Fig. 10-10.

10-5-2. X'tal Oscillator fo Check (VC-106 Board)

Mode	Playback
Signal	Alignment tape for operational check
Measurement point	W401 pin ④ (FSC) (JL403)
Measuring instrument	Frequency counter Oscilloscope
Specified value	$4433619 \pm 50\text{Hz}$

Note : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Adjustment Method]

- 1) Check that the oscillation frequency at pin ④ of W401 is $4433619 \pm 50\text{Hz}$.

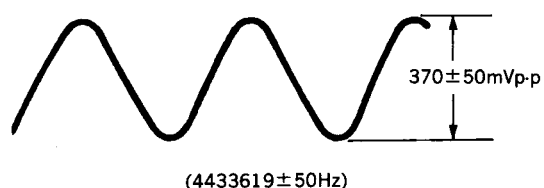


Fig. 10-11.

10-5-3. SYNC AGC Adjustment (VC-106 Board)

Mode	E-E
Signal	Color bar (S VIDEO)
Measurement point	W401 pin ⑧ (EE PB Y) (JL406)
Measuring instrument	Oscilloscope
Adjustment element	RV401
Specified value	$490 \pm 10\text{mVp-p}$

[Adjustment Method]

- 1) Adjust RV401 to obtain the level $490 \pm 10\text{mVp-p}$.

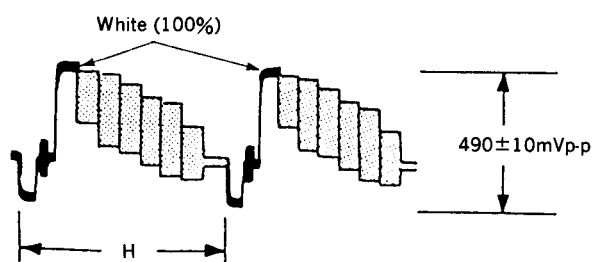


Fig. 10-12.

10-5-4. IR Adjustment (VC-106 Board)

Mode	E-E
Signal	Color bar (VIDEO)
Measurement point	IC401 pin ⑦ (Y COMB OUT) (JL438)
Measuring instrument	Oscilloscope
Adjustment element	RV408
Specified value	Minimize red residual chroma component (40mVp-p or less).

[Adjustment Method]

- 1) Adjust RV408 so that the red residual chroma component is minimized (40mVp-p or less).

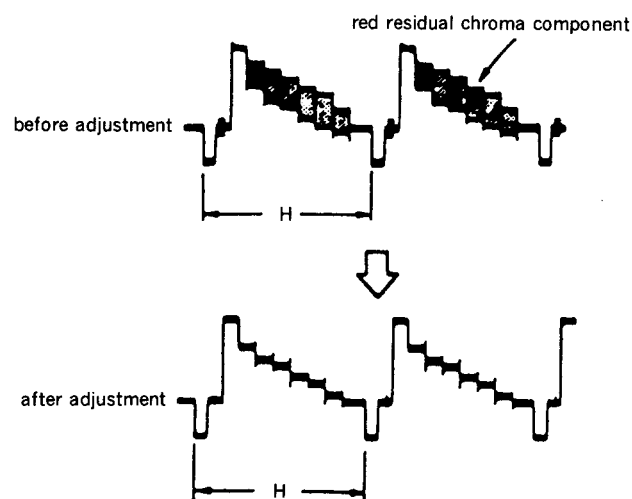


Fig. 10-13.

10-5-5. Chroma Comb Filter Adjustment (1) (VC-106 Board)

Mode	E-E
Signal	Color bar (VIDEO)
Measurement point	IC401 pin ⑩ (C+CD) (JL437)
Measuring instrument	Oscilloscope
Adjustment element	RV402 RV551
Specified value	Minimize red residual chroma component (12mVp-p or less).

[Adjustment Method]

- 1) Adjust RV402 and RV551 alternately so that the red residual chroma component is minimized (12mVp-p or less).

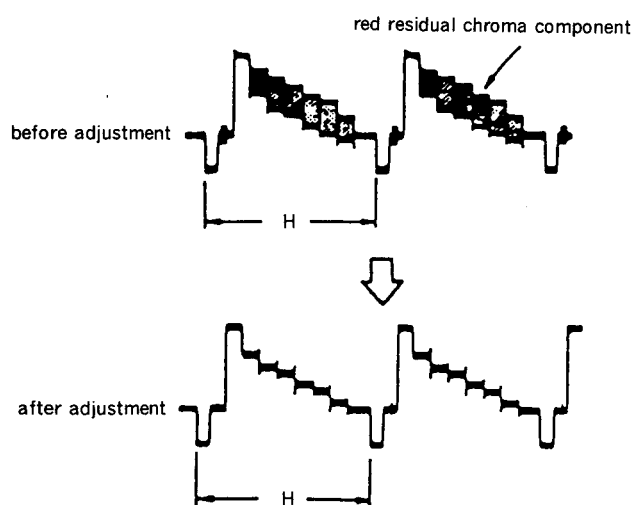


Fig. 10-14.

10-5-6. Emphasis Input Level Adjustment (VC-106 Board)

Mode	E-E
Signal	Color bar (S VIDEO)
Measurement point	Q420 emitter (JL441)
Measuring instrument	Oscilloscope
Adjustment element	RV409
Specified value	$500 \pm 10\text{mVp-p}$

[Adjustment Method]

- 1) Adjust RV409 to obtain the level $500 \pm 10\text{mVp-p}$.

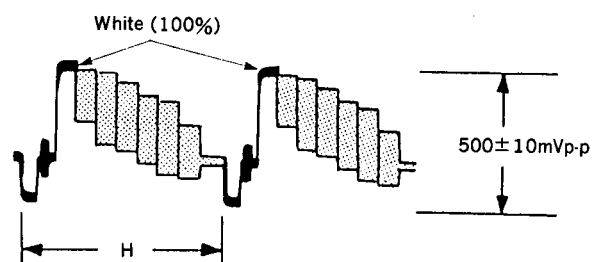


Fig. 10-15.

10-5-7. L Mode PB Y Level Adjustment (VC-106 Board)

Mode	Playback
Signal	Alignment tape : for operational check (WR5-4CSP or WR5-5CSP) color bar portion
Measurement point	W401 pin ⑧ (EE PB Y) (JL406)
Measuring instrument	Oscilloscope
Adjustment element	RV411
Specified value	$490 \pm 10 \text{mVp-p}$

[Adjustment Method]

- 1) Adjust RV411 to obtain the level $490 \pm 10 \text{mVp-p}$.

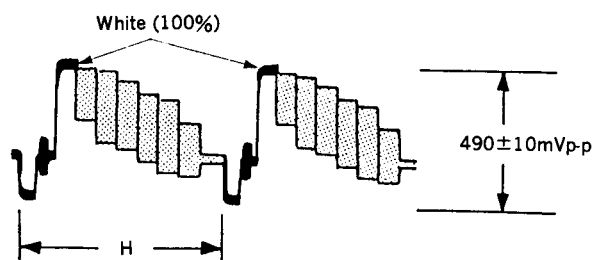


Fig. 10-16.

10-5-8. E Mode PB Y Level Adjustment (VC-106 Board)

Mode	Playback
Signal	Alignment tape : for operational check (WR5-8CSE) color bar portion
Measurement point	W401 pin ⑧ (EE PB Y) (JL406)
Measuring instrument	Oscilloscope
Adjustment element	RV410
Specified value	$490 \pm 10 \text{mVp-p}$

[Adjustment Method]

- 1) Adjust RV410 to obtain the level $490 \pm 10 \text{mVp-p}$.

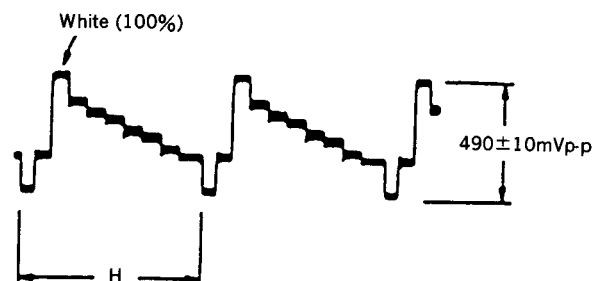


Fig. 10-17.

10-5-9. L Mode Y FM Deviation, Y FM Carrier Frequency Adjustment

Note : After this adjustment, "10-5-10. E Mode Y FM Deviation, Y FM Carrier Frequency Adjustment" should be always performed.

(1) L Mode Y FM Deviation Adjustment (VC-106 Board)

Mode	Record and Playback
Signal	Color bar (S VIDEO)
Measurement point	W401 pin ⑧ (EE PB Y) (JL406)
Measuring instrument	Oscilloscope
Adjustment element	RV404
Specified value	Playback level of $490 \pm 15 \text{mVp-p}$

Note : This adjustment assumes that "L Mode PB Y Level Adjustment" has been already completed.

[Adjustment Method]

- 1) Set an MP type cassette tape.
- 2) Record the color bar signal.
- 3) Play back the recorded signal.
- 4) Check the playback output level.
Specification : $490 \pm 15 \text{mVp-p}$
- 5) If the specification is not met, turn RV404 as specified below and then repeat Steps 1) to 3).

	Direction of turning RV404
If larger than specified value	Counterclockwise ($\curvearrowright$)
If smaller than specified value	Clockwise ($\curvearrowleft$)

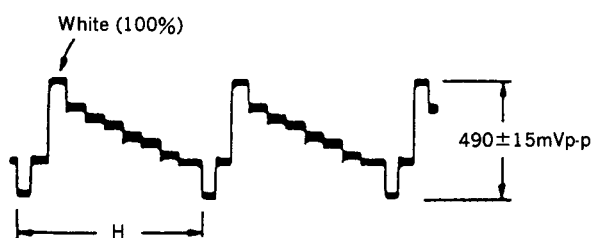


Fig. 10-18.

(2) L Mode Y FM Carrier Frequency Adjustment (VC-106 Board)

Mode	E-E
Signal	No signal
Measurement point	W401 pin ③ (Y RF) (JL428)
Measuring instrument	Frequency counter Oscilloscope
Adjustment element	RV407
Specified value	$4.37 \pm 0.04 \text{MHz}$

Note : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Adjustment Method]

- 1) Set an MP type cassette tape.
- 2) Adjust RV407 to obtain the level $4.37 \pm 0.04 \text{MHz}$.



$4.37 \pm 0.04 \text{MHz}$

Fig. 10-19.

10-5-10. E Mode Y FM Deviation, Y FM Carrier Frequency Adjustment

Note 1 : This adjustment assumes that "10-5-9. L Mode Y FM Deviation, Y FM Carrier Frequency Adjustment" has been already completed.

Note 2 : The following check should be performed before entering this adjustment :

1. Check to ensure that a connector is inserted into the S VIDEO IN/OUT terminal (also when no signal is applied).

(1) E Mode Y FM Deviation Adjustment (VC-106 Board)

Mode	Record and Playback
Signal	Color bar (S VIDEO)
Measurement point	W401 pin ⑧ (EE PB Y) (JL406)
Measuring instrument	Oscilloscope
Adjustment element	RV405
Specified value	Playback level of $490 \pm 15 \text{mVp-p}$

Note : This adjustment assumes that "E Mode PB Y Level Adjustment" has been already completed.

[Adjustment Method]

- 1) Set an ME type cassette tape.
- 2) Record the color bar signal.
- 3) Play back the recorded signal.
- 4) Check the playback output level.
Specification : $490 \pm 15 \text{mVp-p}$
- 5) If the specification is not met, turn RV405 as specified below and then repeat Steps 1) to 3).

	Direction of turning RV405
If larger than specified value	Counterclockwise ($\curvearrowright$)
If smaller than specified value	Clockwise ($\curvearrowleft$)

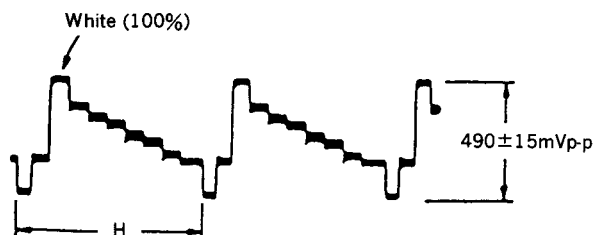


Fig. 10-20.

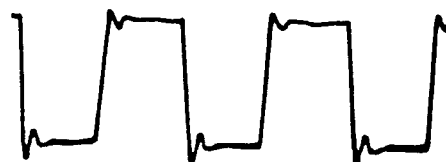
(2) E Mode Y FM Carrier Frequency Adjustment (VC-106 Board)

Mode	E-E
Signal	No signal
Measurement point	W401 pin ③ (Y RF) (JL428)
Measuring instrument	Frequency counter Oscilloscope
Adjustment element	RV406
Specified value	$5.98 \pm 0.04 \text{MHz}$

Note : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Adjustment Method]

- 1) Set an ME type cassette tape.
- 2) Adjust RV406 to obtain the level $5.98 \pm 0.04 \text{MHz}$.



$5.98 \pm 0.04 \text{MHz}$

Fig. 10-21.

10-5-11. YD Adjustment (VC-106 Board)

Mode	Playback
Signal	Alignment tape: for operational check dropout portion
Measurement point	VIDEO OUT terminal (terminated at 75Ω)
Measuring instrument	Oscilloscope
Adjustment element	RV403
Specified value	The dropout portion must be flat.

[Adjustment Method]

- 1) Adjust RV403 so that the dropout portion is flat.

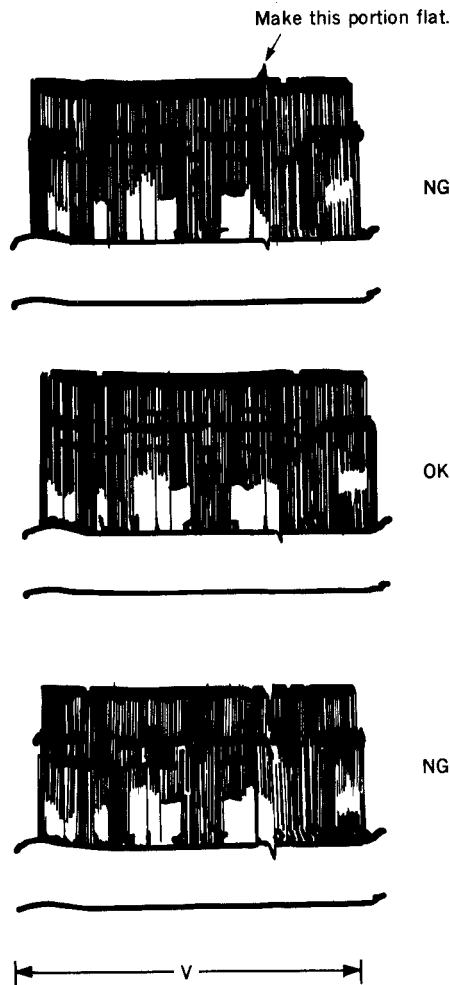


Fig. 10-22.

10-5-12. Chroma Emphasis Adjustment (VC-106 Board)

Mode	Playback
Signal	Alignment tape: for operational check color bar portion
Measurement point	VIDEO IN/OUT terminal
Measuring instrument	Vectorscope
Adjustment element	FL502
Specified value	The vector locus from blue to black must return to the origin.

[Adjustment Method]

- 1) Adjust FL502 so that the vector locus from blue to black returns to the origin.

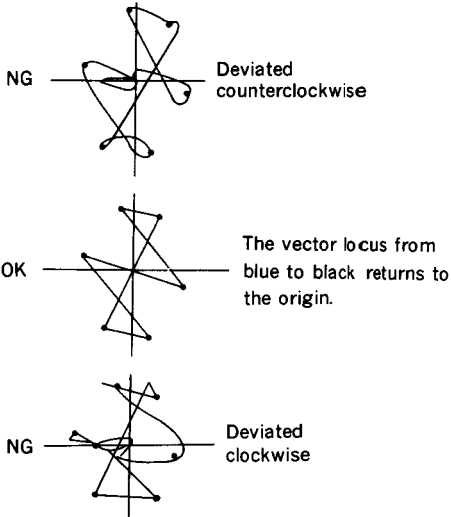


Fig. 10-23.

10-5-13. Chroma Comb Filter Adjustment (2) (VC-106 Board)

Mode	Playback
Signal	Alignment tape :for operational check color bar portion
Measurement point	VIDEO IN/OUT terminal
Measuring instrument	Vectorscope
Adjustment element	RV551 RV402
Specified value	The vectorscope shows no change when EDIT switch is toggled between ON and OFF.

[Adjustment Method]

- 1) Adjust RV551 so that the vectorscope shows no change in the direction of phase.
- 2) If there is also any change in the direction of amplitude, adjust RV402.
- 3) Repeat Steps 1) and 2) until the vectorscope shows no change when the EDIT switch is toggled between ON and OFF repeatedly.

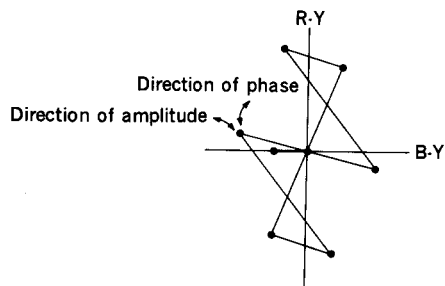


Fig. 10-24.

5-5-14. REC C RF Level Adjustment (VC-106 Board)

Mode	Playback
Signal	Color bar signal
Measurement point	W401 pin ③ (REC C RF) (JL427)
Measuring instrument	Oscilloscope
Adjustment element	RV501
Specified value	$130 \pm 5 \text{mVp-p}$.

[Adjustment Method]

- 1) Adjust RV501 so that the flat portion of the chroma signal RED component has the level $130 \pm 5 \text{mVp-p}$.

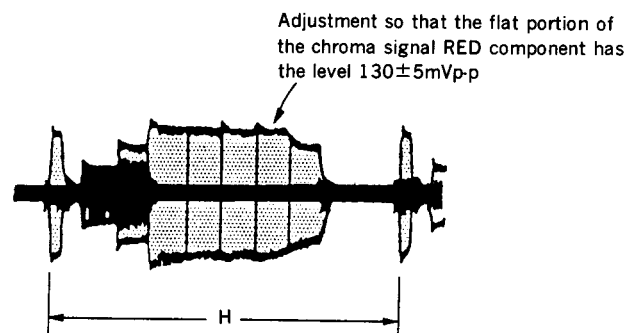


Fig. 10-25.

10-5-15. Recording Current Adjustment (VS-106 Board)

Note : An ME tape is used and E mode (LP) is selected for this adjustment. Check to ensure that these conditions are met before entering. Also, this adjustment assumes that "REC C RF Level Adjustment" has been completed.

(1) REC Y Recording Current Preset Adjustment

Mode	Record (LP)
Signal	No signal
Measurement point	CN002 pin ⑧ (REC 1A)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	2A
Specified value	$350 \pm 10 \text{mVp-p}$

[Adjustment Method]

- 1) Set an ME tape and select Record mode (LP).
- 2) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 3) Select adjustment page D and adjustment address 2A with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust to $350 \pm 10 \text{mVp-p}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

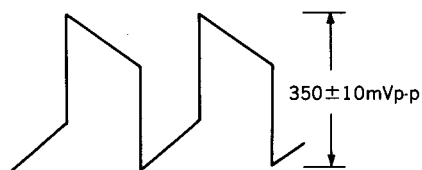


Fig. 10-26.

(2) REC C Recording Current Preset Adjustment

A : In case of REC 1A

Mode	Record (LP)
Signal	Color bar
Measurement point	CH-1 : CN002 pin ⑧ (REC 1A) CH-2 : CN002 pin ⑨ (1/2 RF SWP)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	26 20
Specified value	$90 \pm 3 \text{mVp-p}$

[Connection]

- 1) Short the REC Y RF (JL156) and the REC 5V (JL154).
- 2) Short the REF PILOT (JL788) and the REG GND (JL699).
- 3) Remove the AU-121 board.

[Adjustment Method]

- 1) Set an ME tape and select Record mode (LP).
- 2) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 3) Select adjustment page D and adjustment address 26 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust to $90 \pm 3 \text{mVp-p}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Set to adjustment address 20 and write the same data for adjustment address 26 with the adjustment remote control.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

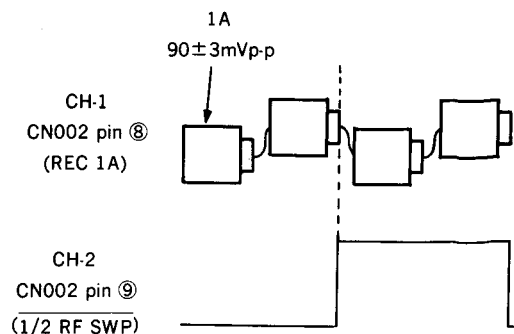


Fig. 10-27.

B: In case of REC 1B

Mode	Record (LP)
Signal	Color bar
Measurement point	CH-1 : CN002 pin ⑦ (REC 1B) CH-2 : CN002 pin ⑨ (1/2 RF SWP)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	27 21
Specified value	$90 \pm 3\text{mVp-p}$

[Connection]

- 1) Short the REC Y RF (JL156) and the REC 5V (JL154).
- 2) Short the REF PILOT (JL788) and the REG GND (JL699).
- 3) Remove the AU-121 board.

[Adjustment Method]

- 1) Set an ME tape and select Record mode (LP).
- 2) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 3) Select adjustment page D and adjustment address 27 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust to $90 \pm 3\text{mVp-p}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Set to adjustment address 21 and write the same data for adjustment address 27 with the adjustment remote control.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

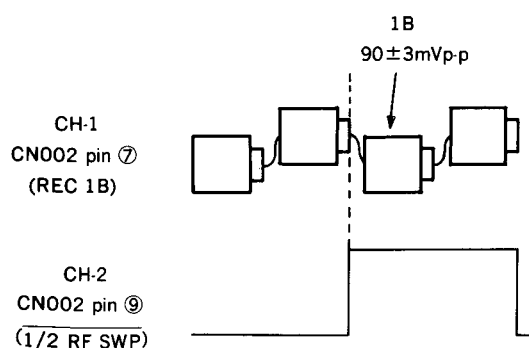


Fig. 10-28.

C: In case of REC 2A

Mode	Record (LP)
Signal	Color bar
Measurement point	CH-1 : CN002 pin ⑥ (REC 2A) CH-2 : CN002 pin ⑨ (1/2 RF SWP)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	28 22
Specified value	$90 \pm 3\text{mVp-p}$

[Connection]

- 1) Short the REC Y RF (JL156) and the REC 5V (JL154).
- 2) Short the REF PILOT (JL788) and the REG GND (JL699).
- 3) Remove the AU-121 board.

[Adjustment Method]

- 1) Set an ME tape and select Record mode (LP).
- 2) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 3) Select adjustment page D and adjustment address 28 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust to $90 \pm 3\text{mVp-p}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Set to adjustment address 22 and write the same data for adjustment address 28 with the adjustment remote control.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

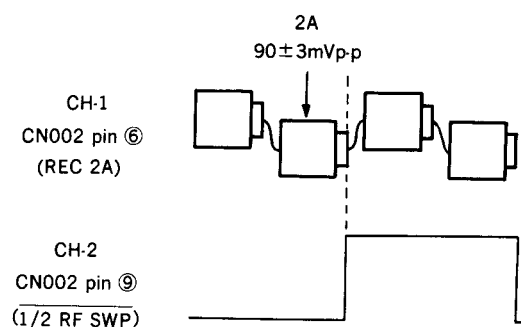


Fig. 10-29.

D : In case of REC 2B

Mode	Record (LP)
Signal	Color bar
Measurement point	CH-1 : CN002 pin ⑤ (REC 2B) CH-2 : CN002 pin ⑨ (1/2 RF SWP)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	29 23
Specified value	$90 \pm 3\text{mVp-p}$

[Connection]

- 1) Short the REC Y RF (JL156) and the REC 5V (JL154).
- 2) Short the REF PILOT (JL788) and the REG GND (JL699).
- 3) Remove the AU-121 board.

[Adjustment Method]

- 1) Set an ME tape and select Record mode (LP).
- 2) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 3) Select adjustment page D and adjustment address 29 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust to $90 \pm 3\text{mVp-p}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Set to adjustment address 23 and write the same data for adjustment address 29 with the adjustment remote control.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

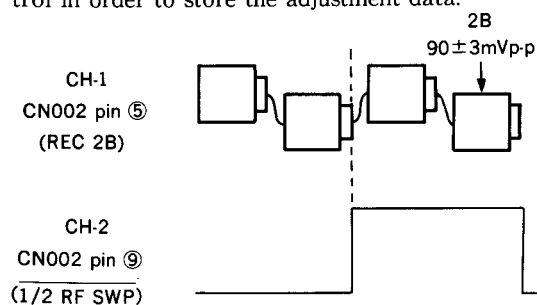


Fig. 10-30.

(3) REC AFM Recording Current Preset Check

Mode	Record (LP)
Signal	No signal
Measurement point	Q197 emitter (REC C RF)
Measuring instrument	Oscilloscope
Specified value	$80 \pm 20\text{mVp-p}$

[Connection]

- 1) Short the REF PILOT (JL788) and the REG GND (JL699).

[Checking Method]

- 1) Set an ME tape and select Record mode (LP).
- 2) Check for $80 \pm 20\text{mVp-p}$.

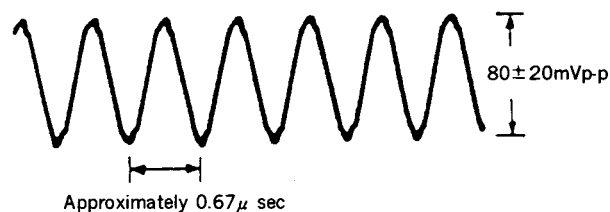


Fig. 10-31.

(4) REC ATF Recording Current Preset Check

Mode	Record (LP)
Signal	No signal
Measurement point	Q197 emitter (REC C RF)
Measuring instrument	Oscilloscope
Specified value	$40 \pm 10\text{mVp-p}$

[Connection]

- 1) Remove the AU-121 board.

[Checking Method]

- 1) Set an ME tape and select Record mode (LP).
- 2) Check for $40 \pm 10\text{mVp-p}$.

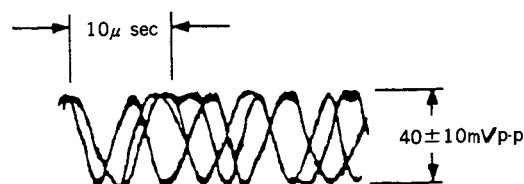


Fig. 10-32.

(5) Chroma Flicker Check and Adjustment (VS-87 Board)

Mode	Self record playback
Signal	Color bar
Measurement point	CH-1 (1 : 1 probe): Q506 collector (PB C RF IN) CH-2 (10 : 1 probe): CN002 pin ⑨ (1/2 RF SWP)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	26 (ME REC C 1A) 27 (ME REC C 1B) 28 (ME REC C 2A) 29 (ME REC C 2B)
Specified value	$\frac{V_{c1a}}{V_{c1a'}} \times 100 = 100 \pm 1\frac{1}{2} (\%)$ $\frac{V_{c2a}}{V_{c2a'}} \times 100 = 100 \pm 1\frac{1}{2} (\%)$

Note : This adjustment assumes that both “REC Y Recording Current Preset Adjustment” and “REC C Recording Current Preset Adjustment” have been completed.

[Checking Method]

- 1) Record the color bar signal.
- 2) Play back the recorded portion.
- 3) Select adjustment page 0, adjustment address 01 and adjustment data 00 with the adjustment remote control.
- 4) Let 1a and 2a output levels measured to be V_{c1a} and V_{c2a} respectively.
- 5) Select adjustment page 0, adjustment address 01 and adjustment data 04 with the adjustment remote control.
- 6) Let 1a and 2a output levels measured to be $V_{c1a'}$ and $V_{c2a'}$ respectively.
- 7) If any of the specified values is not met, perform the following adjustment.

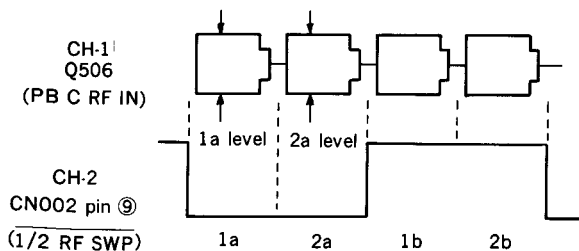


Fig. 10-33.

[Adjustment Method]

- 1) If any of the specified values is not met, from the measured values, calculate the following values:

$$\Delta V_{c1} = |V_{c1a} - V_{c1a'}| / 2$$

$$\Delta V_{c2} = |V_{c2a} - V_{c2a'}| / 2$$

Note : | | represents an absolute value.

- 2) Make the following calculations:

The smaller level of playback levels V_{c1a} and $V_{c1a'}$ is:

$$A = \left\{ \frac{(\text{Smaller value of } V_{c1a} \text{ and } V_{c1a'}) + \Delta V_{c1}}{(\text{Smaller value of } V_{c1a} \text{ and } V_{c1a'})} \right\} \times 52(\text{mVp-p})$$

The larger level of playback levels V_{c1a} and $V_{c1a'}$ is:

$$B = \left\{ \frac{(\text{Larger value of } V_{c1a} \text{ and } V_{c1a'}) - \Delta V_{c1}}{(\text{Larger value of } V_{c1a} \text{ and } V_{c1a'})} \right\} \times 52(\text{mVp-p})$$

The smaller level of playback levels V_{c2a} and $V_{c2a'}$ is:

$$C = \left\{ \frac{(\text{Smaller value of } V_{c2a} \text{ and } V_{c2a'}) + \Delta V_{c2}}{(\text{Smaller value of } V_{c2a} \text{ and } V_{c2a'})} \right\} \times 52(\text{mVp-p})$$

The larger level of playback levels V_{c2a} and $V_{c2a'}$ is:

$$D = \left\{ \frac{(\text{Larger value of } V_{c2a} \text{ and } V_{c2a'}) - \Delta V_{c2}}{(\text{Larger value of } V_{c2a} \text{ and } V_{c2a'})} \right\} \times 52(\text{mVp-p})$$

- 3) Let the values calculated from V_{c1a} , $V_{c1a'}$, V_{c2a} and $V_{c2a'}$ to be the specified values for 1a, 1b, 2a, and 2b respectively. Based on these specifications, perform “REC C Recording Current Preset Adjustment”.

When adjusting to the specified value, compare V_{c1a} with $V_{c1a'}$. If V_{c1a} is larger than $V_{c1a'}$, set 1a to A and 1b to B. If V_{c1a} is smaller than $V_{c1a'}$, set 1a to B and 1b to A.

In the same manner, compare V_{c2a} with $V_{c2a'}$. If V_{c2a} is larger than $V_{c2a'}$, set 2a to C and 2b to D. If V_{c2a} is smaller than $V_{c2a'}$, set 2a to D and 2b to C.

- 4) After this adjustment, perform “Chroma Flicker Check” again and repeat this adjustment until the specifications are met.

10-5-16. Y Level Adjustment (VS-87 Board)

Mode	E-E
Signal	Color bar (S VIDEO)
Measurement point	CN304 pin ⑰ (V OUT Y) (JL301)
Measuring instrument	Oscilloscope
Adjustment element	RV301
Specified value	$450 \pm 10 \text{mVp-p}$

Note : This adjustment assumes that “SYNC AGC Adjustment” has been completed.

[Adjustment Method]

- 1) Adjust RV301 to obtain the level $450 \pm 10 \text{mVp-p}$.

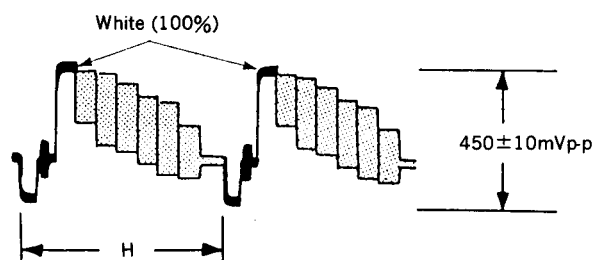


Fig. 10-34.

10-5-17. HUE Phase Deviation Adjustment (VC-106 Board) (Use a Vectorscope)

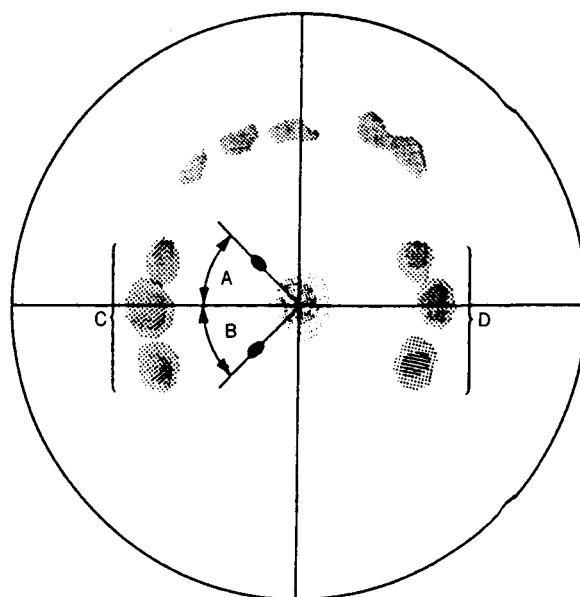
Mode	Playback + Pause
Signal	Alignment tape for operation check (WR5-5CSP), Color bar portion
Measurement point	VIDEO IN/OUT terminal
Measuring instrument	Vectorscope
Adjustment element	RV351 (FSC) RV352 (APC LPF)
Specified value	See Fig. 10-35.

[Connection]

- 1) Input 4.43MHz signal from Pin② of IC501 to 1CH of an oscilloscope.
- 2) Connect 1CH output of an oscilloscope to the EXT. subcarrier reference input of a vectorscope.
- 3) Put on the EXT. subcarrier switch of a vectorscope.

[Adjustment Method]

- 1) Adjust with RV351 so as to equalize A and B as shown in Fig. 10-35.
- 2) Adjust with RV352 so as to minimize the shaking of each three brighting point of C and D.



RV351 : A=B
RV352 : make C and D a contrast

Fig. 10-35.

10-5-18. Titler PLL Adjustment (TI-40 Board)

Mode	E-E
Signal	No signal
Measurement point	See Fig. 10-36. (V_{PLL} : JL832)
Measuring instrument	Oscilloscope (DC range)
Adjustment element	CT801
Specified value	$2.42 \pm 0.1 \text{Vdc}$

[Connection]

- 1) Short pin ⑫ of CN801 (SS 5V : JL821) and pin ④ of IC803 (PLL ADJ : JL831) with a jumper wire.

[Adjustment Method]

- 1) Adjust to $2.42 \pm 0.1 \text{Vdc}$ with CT801.
2) After this adjustment, remove the jumper wire.

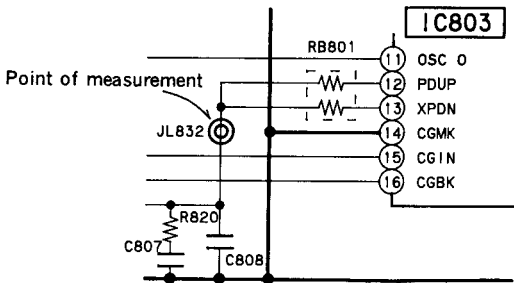


Fig. 10-36.

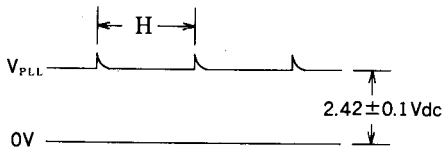


Fig. 10-37.

10-5-19. Character Generator Clock Adjustment (TI-40 Board)

Mode	E-E
Signal	No signal
Measurement point	IC802 pin ⑦ (JL830)
Measuring instrument	Frequency counter Oscilloscope
Adjustment element	CT802
Specified value	$6.94 \pm 0.05 \text{MHz}$

Note : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Adjustment Method]

- 1) Adjust to $6.94 \pm 0.05 \text{MHz}$ with CT802.
2) After this adjustment, remove the jumper wire.

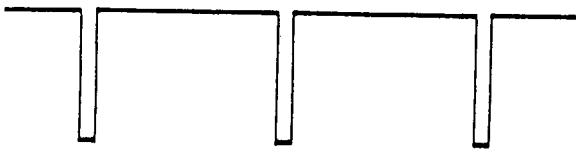


Fig. 10-38.

10-6. AUDIO SYSTEM ADJUSTMENT

- The color bar signal should be used as the video signal input for these adjustments.

[Connection of Audio Measuring Instruments]

When performing the Audio System Adjustment, connect audio system measuring instruments as well as video system measuring instruments as illustrated in Fig. 10-39. And place the POWER switch in the "VIDEO" position. Change the IN/OUT select switch depending on the current mode as follows :

- IN position Record mode
- OUT position Playback mode

Unless otherwise specified, place the BILINGUAL switch in the following position :

- Green (STEREO) position

Note 1 : When inputting audio signal, input the same signal on both the L and R channels unless otherwise specified.

Note 2 : Be sure to insert a plug (shorting plug or dummy plug) into the AUDIO IN/OUT terminal (right). If no plug is inserted to the terminal, the MONAURAL mode is activated which does not permit correct adjustment.

(MONAURAL mode)

Record The REC AFM RF 1.7MHz carrier will not be output.

Playback L+R signal will be output from the audio INPUT/OUTPUT terminal (left).

Note 3 : For the adjustment items in which the adjustment is made on both L and R channels, [] indicates the adjustment item on the R channel.

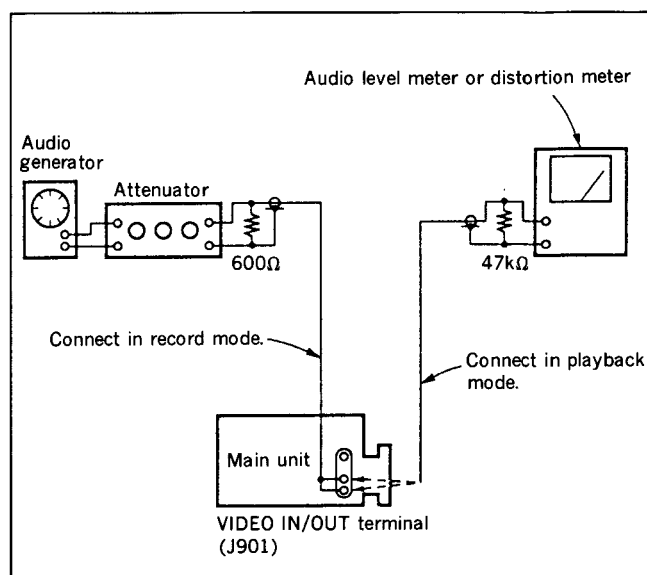


Fig. 10-39.

[Adjustment Sequence]

- 10-6-1. Recording Matrix L—R Adjustment
- 10-6-2. Recording Matrix L+R Check
- 10-6-3. IR Adjustment
- 10-6-4. 1.5MHz Carrier Frequency Check
- 10-6-5. 1.7MHz Carrier Frequency Check
- 10-6-6. Deviation Adjustment
- 10-6-7. Playback Matrix L—R Adjustment
- 10-6-8. 1.5MHz Recording Level Check
- 10-6-9. 1.7MHz Recording Level Check
- 10-6-10. Overall Level Characteristic Check
- 10-6-11. Overall Frequency Characteristic Check
- 10-6-12. Overall Level Characteristic Separation Check
- 10-6-13. Overall Distortion Check
- 10-6-14. Overall Noise Level Check

10-6-1. Recording Matrix L-R Adjustment (AU-121 Board)

Mode	Record
Signal	400Hz, -7.5dBs: Input to AUDIO IN/OUT jacks, L and R channels
Measurement point	IC802 pin ⑪ (JL863)
Measuring instrument	Oscilloscope
Adjustment element	RV806
Specified value	$0 \pm 5\text{mVp-p}$

Note : A 1 : 1 probe should be used.

[Adjustment Method]

- 1) Adjust RV806 so that the signal level is $0 \pm 5\text{mVp-p}$.

10-6-2. Recording Matrix L+R Check (AU-121 Board)

Mode	Record
Signal	1. 400Hz, -7.5dBs: AUDIO IN/OUT jack, L channel 2. 400Hz, -7.5dBs: AUDIO IN/OUT jack, R channel
Measurement point	IC801 pin ⑪ (JL843)
Measuring instrument	Oscilloscope
Specified value	The difference in the level measured for between input to L-channel jack and input to R-channel jack must be within $0 \pm 10\text{mVp-p}$.

Note : When measuring the signal level at pin ⑪ of IC801, allow more than 1 minute after the signal is input before measurement. (This is intended to stabilize the AGC.)

[Checking Method]

- 1) Input the signal 400Hz, -7.5dBs only to the L-channel AUDIO IN/OUT jack. (Insert a shorting plug into the R-channel AUDIO IN/OUT jack.)
- 2) Read the signal level at pin ⑪ of IC801 and make a note of it.
- 3) Input the signal 400Hz, -7.5dBs only to the R-channel AUDIO IN/OUT jack. (Insert a shorting plug into the L-channel AUDIO IN/OUT jack.)
- 4) Check to ensure that the level at pin ⑪ of IC801 is [the level measured in Step 2)] $\pm 10\text{mVp-p}$.

10-6-3. IR Adjustment (AU-121 Board)

Mode	Self record playback
Measurement point	1.5M IR : IC801 pin ④ (JL852)-pin ⑥ (JL853) 1.7M IR : IC802 pin ④ (JL874)-pin ⑥ (JL875)
Measuring instrument	Digital voltmeter
Adjustment element	1.5M IR : RV801 1.7M IR : RV803
Specified value	$0 \pm 10\text{mVdc}$

[Adjustment Method]

- 1) Record the signal.
- 2) Play back the signal recorded in Step 1).
- 3) Adjust RV801 and RV803 so that the potential differences between the two points for 1.5M IR and 1.7M IR are $0 \pm 10\text{mVdc}$ respectively.

10-6-4. 1.5MHz Carrier Frequency Check (AU-121 Board)

Mode	Record
Signal	No signal
Measurement point	IC801 pin ⑧ (JL848)
Measuring instrument	Frequency counter Oscilloscope
Specified value	$1.500 \pm 0.002\text{MHz}$

Note 1 : A 10 : 1 probe should be used for connection of a frequency counter.

Note 2 : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Checking Method]

- 1) Check the 1.5MHz carrier frequency for $1.500 \pm 0.002\text{MHz}$.



$1.500 \pm 0.002\text{MHz}$

Fig. 10-40.

10-6-5. 1.7MHz Carrier Frequency Check (AU-121 Board)

Mode	Record
Signal	No signal
Measurement point	IC802 pin ⑧ (JL868)
Measuring instrument	Frequency counter Oscilloscope
Specified value	$1.700 \pm 0.002\text{MHz}$

Note 1 : A 10 : 1 probe should be used for connection of a frequency counter.

Note 2 : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Checking Method]

- 1) Check the 1.7MHz carrier frequency for $1.700 \pm 0.002\text{MHz}$.

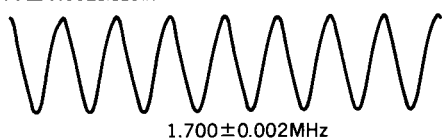


Fig. 10-41.

10-6-6. Deviation Adjustment (AU-121 Board)

(1) 1.5MHz Deviation Adjustment

Mode	Playback
Signal	Alignment tape : for operational check (WR5-9CS)
Measurement point	AUDIO IN/OUT jack, L channel
Measuring instrument	Audio level meter
Adjustment element	RV802
Specified value	$-7.5 \pm 0.2\text{dB}$

Note : Set the BILINGUAL switch to MAIN.

[Adjustment Method]

- 1) Adjust RV802 to obtain the level $-7.5 \pm 0.2\text{dB}$.

(2) 1.7MHz Deviation Adjustment

Mode	Playback
Signal	Alignment tape : for operational check (WR5-9CS)
Measurement point	AUDIO IN/OUT jack, R channel
Measuring instrument	Audio level meter
Adjustment element	RV804
Specified value	$-7.5 \pm 0.2\text{dB}$

Note : Set the BILINGUAL switch to SUB.

[Adjustment Method]

- 1) Adjust RV804 to obtain the level $-7.5 \pm 0.2\text{dB}$.

10-6-7. Playback Matrix L-R Adjustment (AU-121 Board)

Mode	Self record playback
Signal	Alignment tape : for operational check (WR5-9CS)
Measurement point	AUDIO IN/OUT jack, L channel
Measuring instrument	Audio level meter
Adjustment element	RV805
Specified value	-40dBs or less

[Adjustment Method]

- 1) Record the signal. (A shorting plug should be inserted into the L-channel AUDIO IN/OUT jack.)
- 2) Play back the recorded portion.
- 3) Adjust RV805 so that the level at the L-channel AUDIO IN/OUT jack is -40dBs or less.

10-6-8. 1.5MHz Recording Level Check (AU-121 Board)

Mode	Record
Signal	No signal
Measurement point	CN801 pin ⑦ (REC AFM) (JL806)
Measuring instrument	Oscilloscope
Specified value	$48 \pm 8\text{mVp-p}$

[Connection]

- 1) Remove the pin plug from the R-channel AUDIO IN/OUT jack (red). (MONORAL Record mode)

[Checking Method]

- 1) Check the 1.5MHz REC AFM RF signal level for $48 \pm 8\text{mVp-p}$. (Read the center level of the bright line width.)

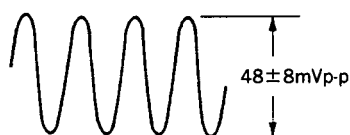


Fig. 10-42.

10-6-9. 1.7MHz Recording Level Check (AU-121 Board)

Mode	Record
Signal	No signal
Measurement point	CN801 pin ⑦ (REC AFM) (JL806)
Measuring instrument	Oscilloscope
Specified value	$42 \pm 6\text{mVp-p}$

Note : When measuring this level, short pin ⑧ of IC801 (JL848) with GND.

[Checking Method]

- 1) Check to ensure that a shorting plug is inserted into the R-channel AUDIO IN/OUT jack (red).
- 2) Check the 1.7MHz REC AFM RF signal level for $42 \pm 6\text{mVp-p}$. (Read the center level of the bright line width.)

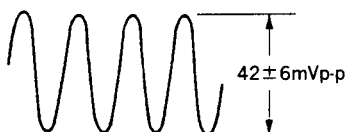


Fig. 10-43.

10-6-10. Overall Level Characteristic Check

Mode	Self record playback
Signal	400Hz, -7.5dBs
Measurement point	AUDIO OUT jack, L channel [R channel]
Measuring instrument	Audio level meter
Specified value	$-7.5 \pm 2\text{dBs}$

[Checking Method]

- 1) Record the signal.
- 2) Play back the recorded portion.
- 3) Check the audio output level for $-7.5 \pm 2\text{dBs}$.

10-6-11. Overall Frequency Characteristic Check

Mode	Self record playback
Signal	④ 400Hz, -17.5dBs ⑤ 30Hz, -17.5dBs ⑥ 10kHz, -17.5dBs
Measurement point	AUDIO OUT jack, L channel [R channel]
Measuring instrument	Audio level meter
Specified value	When 400Hz playback output level is set to 0dB, the respective playback levels for 30Hz and 10kHz must be $0 \pm 3\text{dB}$.

[Checking Method]

- 1) Record the signals ④ to ⑥ in sequence.
- 2) Play back the recorded portion.
- 3) When the 400Hz playback output level is set to 0dB, check to ensure that the respective playback levels for 30Hz and 10kHz are $0 \pm 3\text{dB}$.

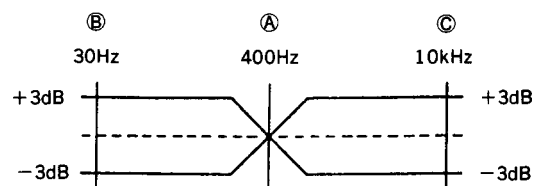


Fig. 10-44.

10-6-12. Overall Level Characteristic Separation Check

Mode	Self record playback
Signal	400Hz, -17.5dBs : AUDIO IN/OUT jack, L channel [R channel] No signal (Insert a shorting plug.): AUDIO IN/OUT jack, R channel [L channel]
Measurement point	AUDIO OUT jack, L channel [R channel]
Measurement instrument	Audio level meter
Specified value	Signal level : $-7.5 \pm 2\text{dBs}$ Crosstalk level : -27.5dBs or less

Note 1 : When measuring the L-channel playback output level, be sure to insert a dummy plug into the R-channel jack.

Note 2 : Make sure that the BILINGUAL switch is placed in the Green (STEREO) position.

[Checking Method]

- 1) Record the signal.
- 2) Play back the recorded portion.
- 3) Check the output level at the L-channel [R-channel] AUDIO IN/OUT jack for -7.5 ± 2 dBs.
- 4) Check the output level at the R-channel [L-channel] AUDIO IN/OUT jack for -27.5 dBs or less.

10-6-13. Overall Distortion Check

Mode	Self record playback
Signal	400Hz, -7.5dBs
Measurement point	AUDIO OUT jack, L channel [R channel]
Measuring instrument	Distortion meter
Specified value	0.8% or less*1

[Checking Method]

- 1) Record the signal.
 - 2) Play back the recorded portion.
 - 3) Check that the distortion factor is 0.8% or less*1.
- * 1: The value when 200Hz to 6kHz BPF is used.

10-6-14. Overall Noise Level Check

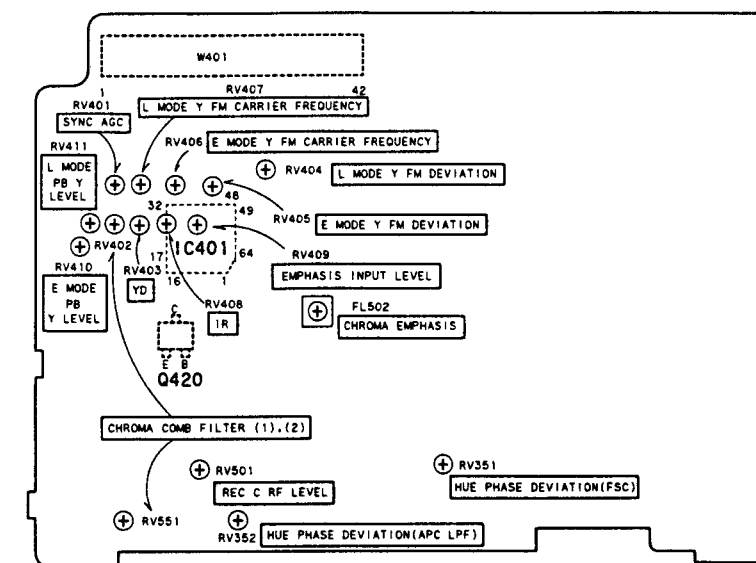
Mode	Self record playback
Signal	No signal (Insert a shorting plug into the AUDIO IN jack.)
Measurement point	Audio OUT jack, L channel [R channel]
Measuring instrument	Audio level meter
Specified value	-65.0dBs or less*2

[Checking Method]

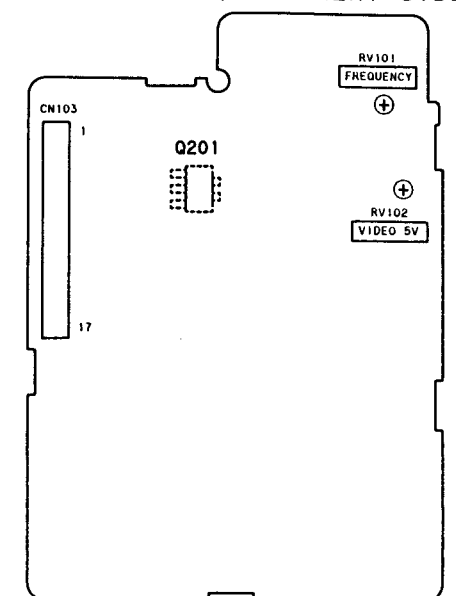
- 1) Record the signal.
 - 2) Play back the recorded portion.
 - 3) Check that the noise level is -65.0dBs or less*².
- * 2: The value when a IHF-A weighing filter is used.

10-7. ADJUSTING PART LOCATION DIAGRAM

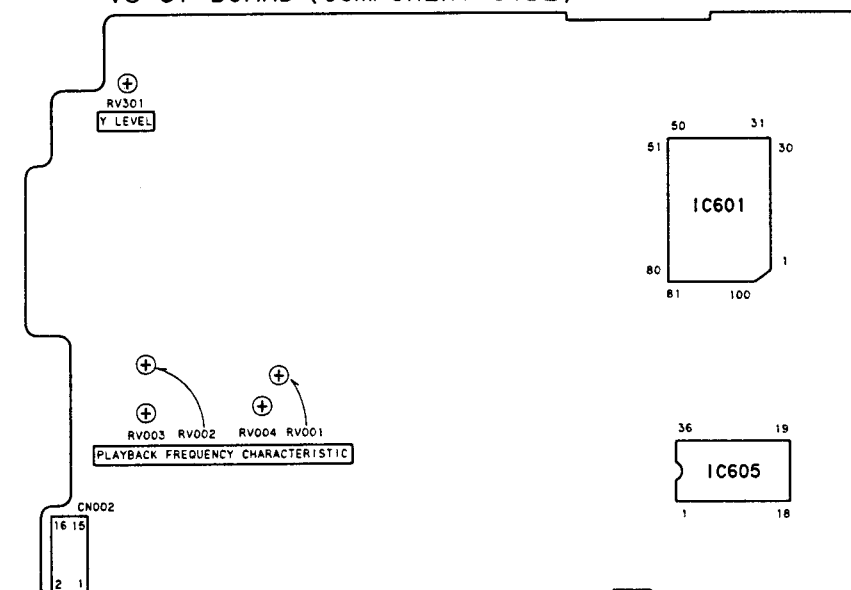
VC-106 BOARD (COMPONENT SIDE)



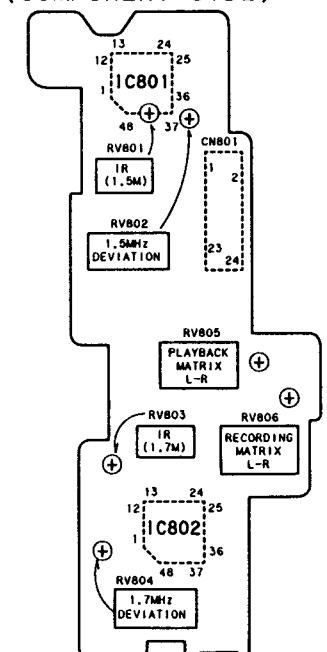
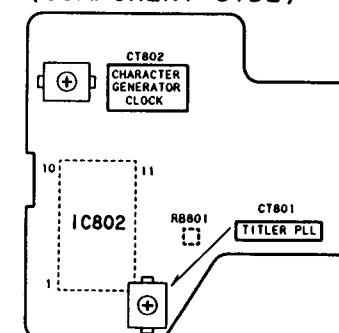
DD-33P BOARD (COMPONENT SIDE)



VS-87 BOARD (COMPONENT SIDE)



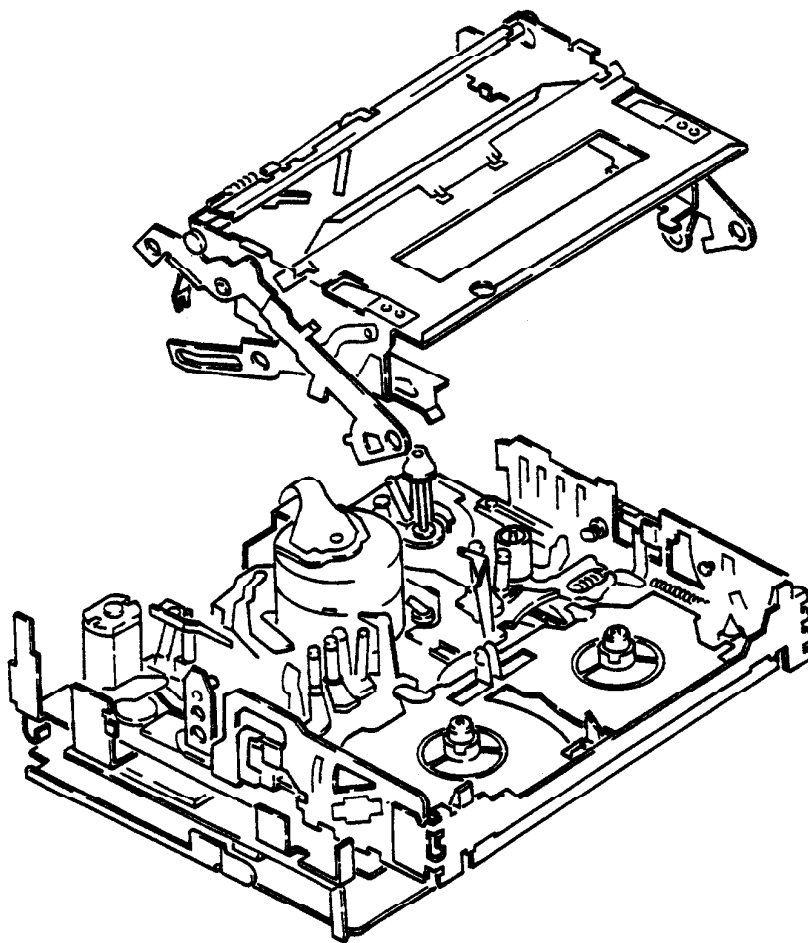
AU-121 BOARD
(COMPONENT SIDE)

TI-40 BOARD
(COMPONENT SIDE)

8mm Video MECHANICAL ADJUSTMENT MANUAL II

FL MECHANISM (Q MECHANISM) Video 8

File with the SERVICE MANUAL



8 VIDEO RECORDER
SONY®

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1. PREPARATION FOR MECHANICAL CHECK, ADJUSTMENT AND MAINTENANCE

For removal of the cabinet and boards, refer to "Disassembly" in each Service Manual.

Mechanical adjustment is done in the **USE** mode. (To select the **USE** mode, refer to "1-4 Handling of Mode Selector".)

1-1 CASSETTE COMPARTMENT HOLDER ASSEMBLY (Fig. 1)

1. Removal

- 1) Select the **USE** mode.
- 2) Remove the screw ①, and then, the LS support ②.
- 3) Remove the four screws ③, and then, the LS frame assy ④.
- 4) Remove the three lock washers ⑤, and then, the washer ⑥, bar, joint ⑦, T protector assy ⑧, and TP arm assy ⑨ in that order.
- 5) Remove the two screws ⑩, and then, the two arm shafts A ⑪.
- 6) Remove the shaft through the long hole ⑫. With the cassette compartment holder assembly ⑬ rotated in a direction of the arrow ⑭, remove the long holes ⑮ and ⑯ from the shaft in that order, and then, remove the cassette compartment holder assembly ⑬.
- 7) Slide the BS holder ⑰ in a direction of the arrow ⑱ as shown in Fig. A and remove it in a direction of the arrow ⑲.

Note : When this is done, be careful not to drop the steel ball and spring, compression out of the BS holder ⑰.

2. Mounting

- 1) Select the **USE** mode.
- 2) Mount the BS holder ⑰ in the reverse order of its removal. **Note :** Refer to Fig. A.
- 3) Mount the shafts in the order of the long holes ⑮, ⑯ and ⑫ of the cassette compartment holder assembly ⑬, respectively.

Note : When this is done, rotate the cassette compartment holder assembly ⑬ in a direction of the arrow ⑭ to mount it until the long hole is aligned with the oval shape of the shaft.

- 4) Align the oval shape of the two arm shafts A ⑪ with the long holes of the LS chassis, fit them in firmly and fix with the two screws ⑩.
- 5) Mount the TP arm assy ⑨, T protector assy ⑧ and bar, joint ⑦, respectively. Then, mount the washer ⑥ and three lock washers ⑤.
- 6) Mount the LS frame assy ④ to the chassis and fix with the four screws ③.
- 7) Mount the LS support ② to the chassis and fix with the screw ①.

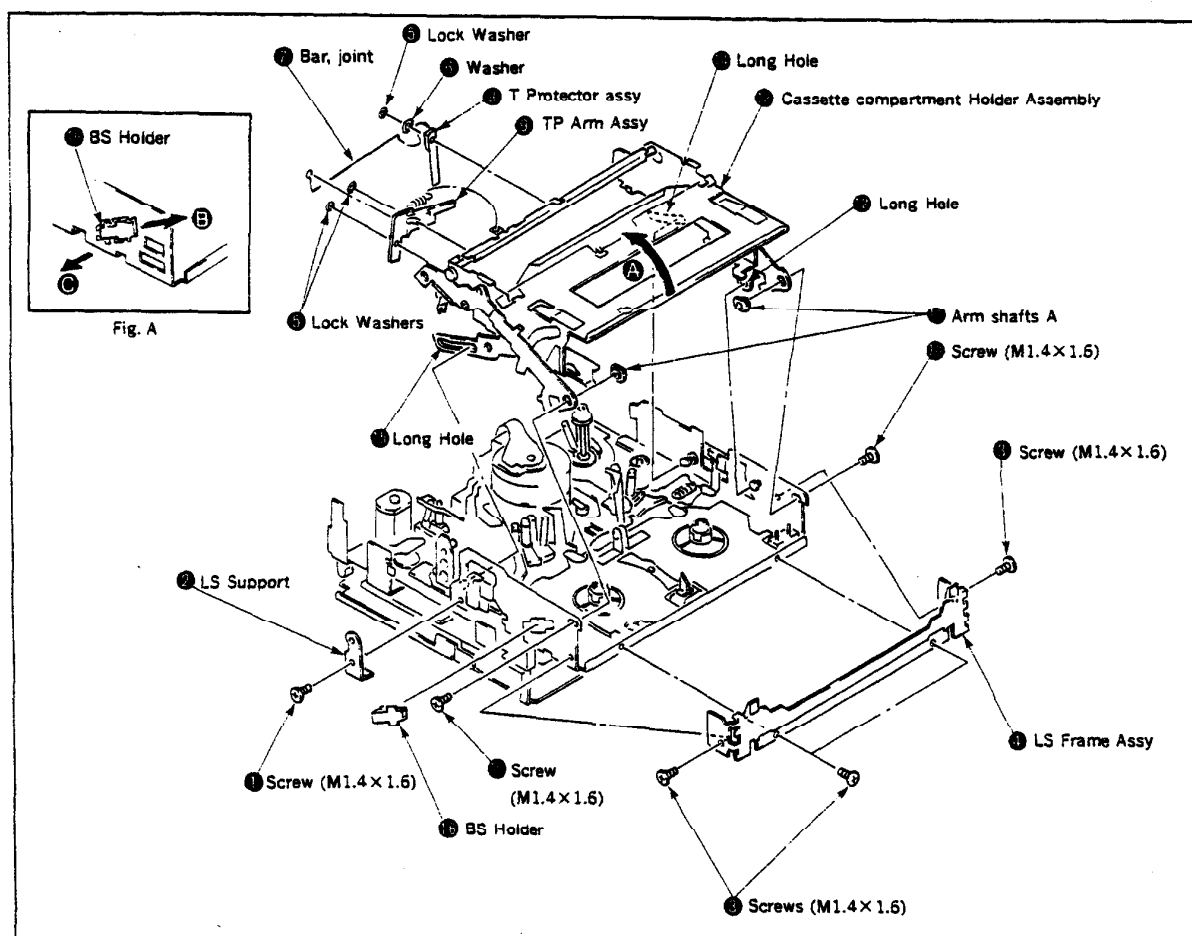


Fig. 1

1-2 CASSETTE COMPARTMENT LOCK HEIGHT ADJUSTMENT (Fig. 2)

- 1) Using a spacer, etc., insert a 15.3mm-thick cassette to lock the cassette compartment.

Note : As shown in Fig. A, a 15.3mm-thick portion may be under the throttle part ②.

- 2) Pressing the part ②, nip the F arm A ① and the first tooth of the C arm adjusting plate ③ with the clip ④, and tighten the adjusting screw ⑤ at a torque of 1kg·cm.

- 3) Apply Screw Lock to the adjusting screw ⑤ after making sure of the following clearances between the throttle part ② of the cassette compartment holder and the cassette as shown in Fig. B.

- For 15mm-thick dummy cassette: 0.5 - 0.9
- For 15.2mm-thick dummy cassette: 0.3 - 0.7

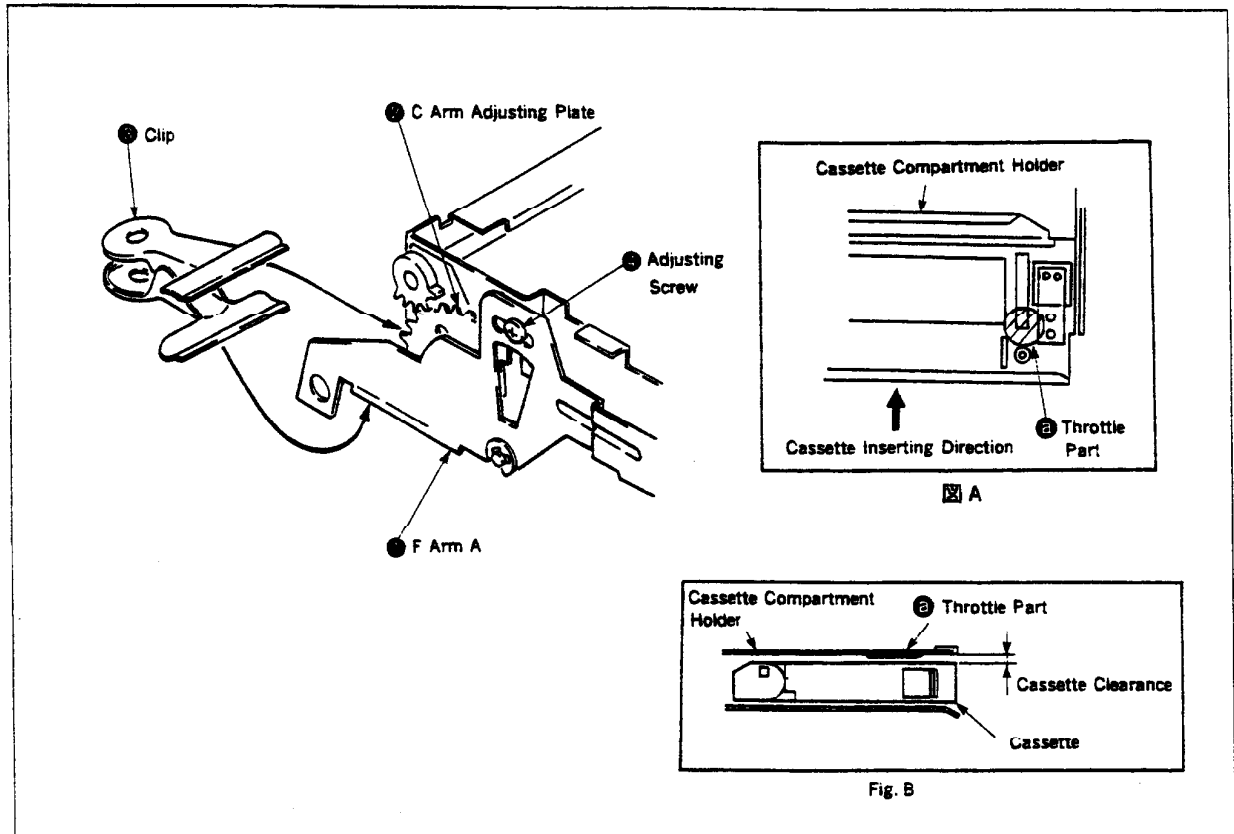


Fig. 2

1-3 OPERATION WITH CASSETTE COMPARTMENT HOLDER ASSEMBLY REMOVED

1. Putting into Loading state (Fig. 3)

- 1) Referring to the Service Manual, supply power with the cabinet and camera section removed. (Make the mechanism deck ready to operate.)
- 2) Place the cap ● on the LED assembly ●.
- 3) Press the pin of the push switch ● (ON state) and fix it with adhesive tape ● in that state.
- 4) Press the locking plate release arm ● in an arrow direction. The set is made ready for loading.

2. Putting into the REC Mode

- 1) Short the TEST pins (SS-82 board CN404 pins ● and ●) for CCD-V11/V88) to place into the TEST mode.

For CCD-V11/V88; SS-82 board CN404

TEST pin connector

4	GND
3	CAM ADJ
2	TEST
1	PATH

The set is placed into the TEST mode by shorting the pins ● and ●.

- 2) After completing the step 1), set the power switch to VTR (or CAMERA).
- 3) Turn on the REC switch. (If the set is placed in the TEST mode, detection of S and T reel table rotation is disabled and the tape can run.)

3. Putting into EJECT

- 1) Turn on the EJECT switch.

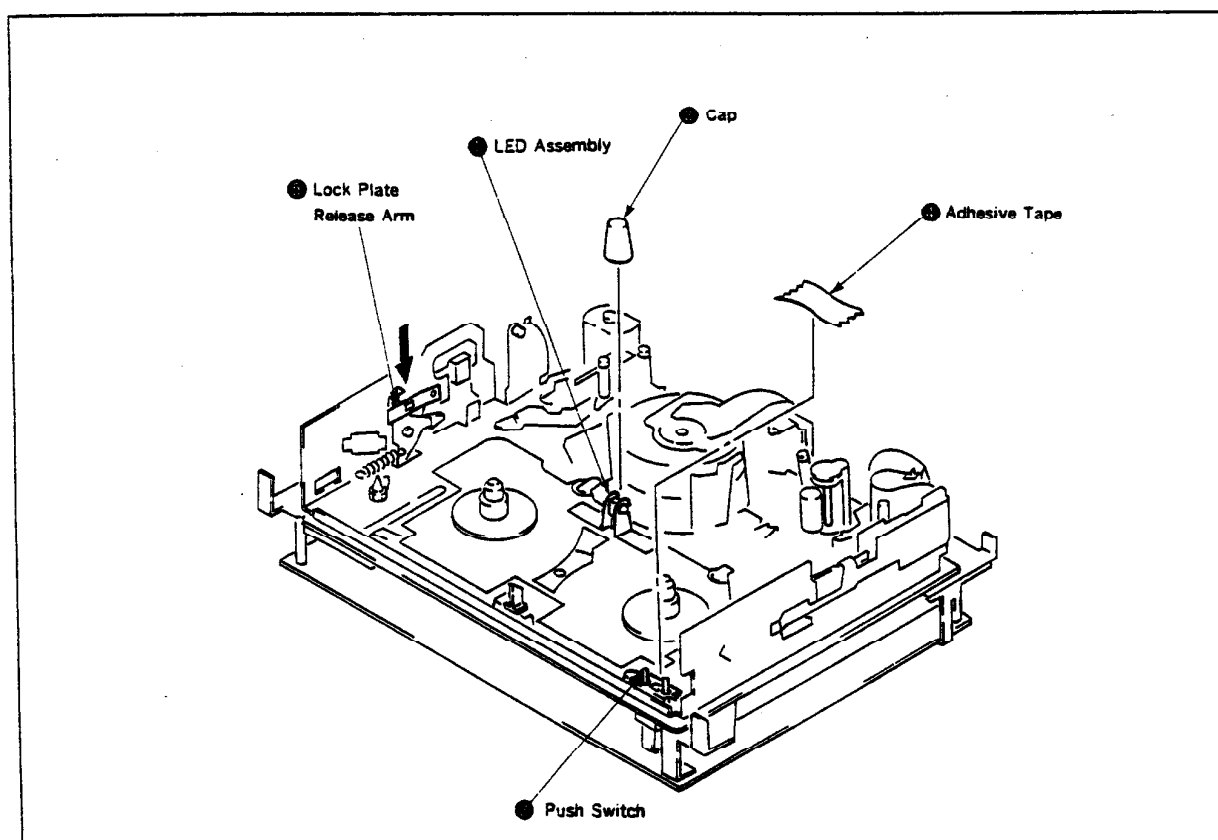


Fig. 3

1-4 HANDLING OF MODE SELECTOR

• Mount the MODE SELECTOR III panel to the mode selector.
U, FL, O and O' mechanisms have different mode indications respectively. Select your desired type. (Fig. 4)

1. Construction (Fig. 5)

2. Connection (Fig. 6)

For CCD-VII/V88

- 1) Remove the plate, ornamental ①.
- 2) Remove the screw ②, and then, the LB-12 board ③.
- 3) Remove the FP-114 flexible connector ④ and loading motor connector ⑤, and insert them into the MODE SELECTOR III conversion connector respectively.
- 4) Insert the M-SW connector of the mode selector into the MODE SELECTOR III conversion connector.

3. Handling

- 1) Use the M mode selector buttons only.
- 2) During mode selection, "BLANK" lights up when no mode is being selected.
- 3) If the right M mode selector button is kept pressed, EJECT, USE, GL, Q.REW, GL, REC and READY light up in that order.
- 4) When changing over from the READY mode back to the EJECT mode, press the left M mode selector button to select your desired mode.

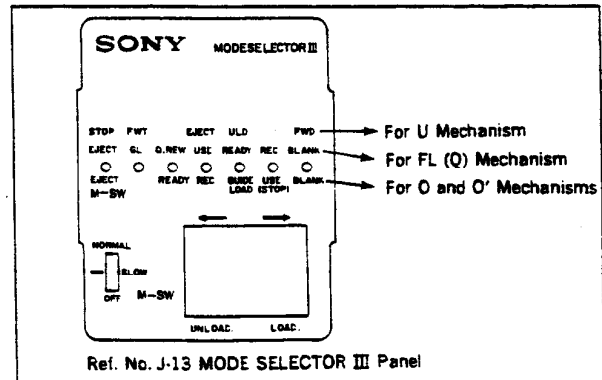


Fig. 4

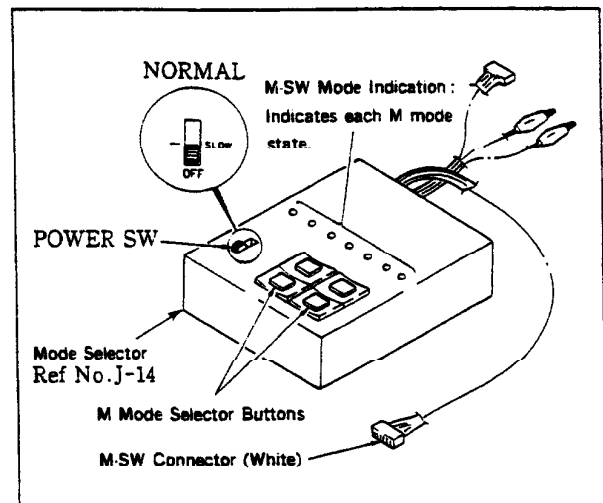


Fig. 5

For CCD-V11/V88

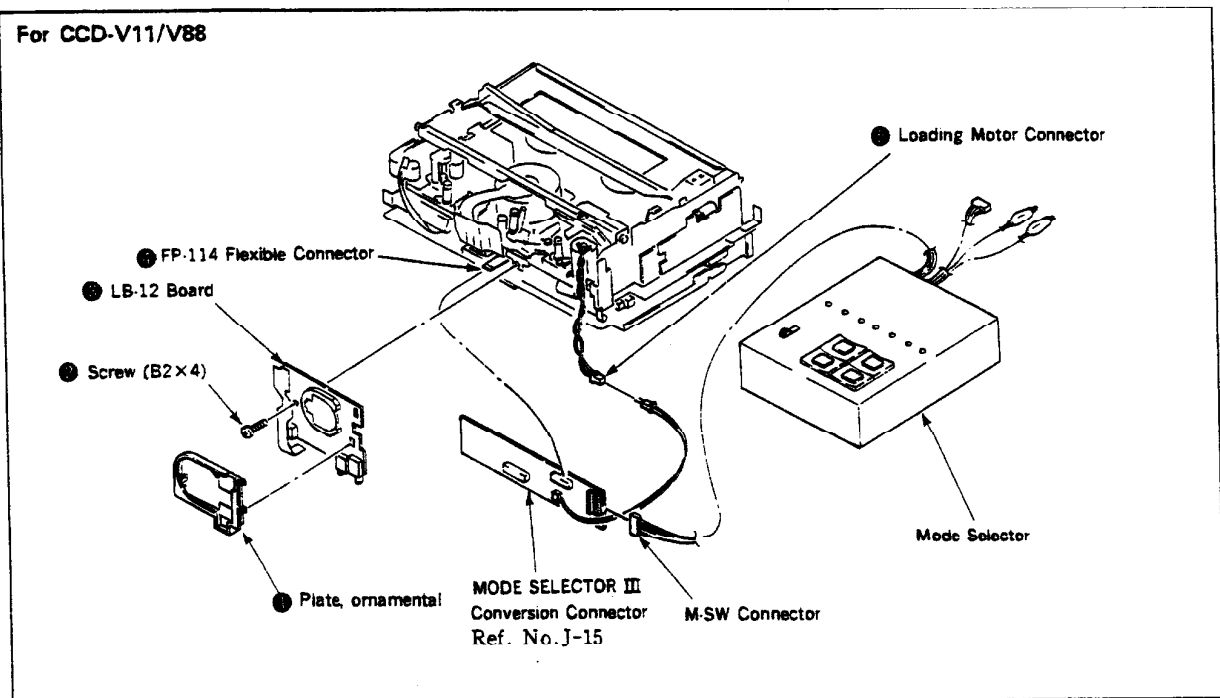


Fig. 6

[illegible]

Ref. No	Part No.	Description	Ref. No	Part No.	Description
<u>CAPACITOR</u>			<u>IC</u>		
C1	1-108-579-00	MILER 0.01 μ F 50V	IC1	8-752-240-28	IC TC4028BP
C2	1-123-333-00	ELECT 100 μ F 24V	IC2	8-752-120-03	IC μ PA2003C
C3	1-108-579-00	MILER 0.01 μ F 50V	IC3	8-759-240-03	IC TC4028BP
C4	1-123-333-00	ELECT 100 μ F 24V	IC4	8-759-120-28	IC μ PA2003C
C101	1-108-579-00	MILER 0.01 μ F 50V			
C102	1-123-333-00	ELECT 100 μ F 24V			
C103	1-108-579-00	MILER 0.01 μ F 50V			
<u>DIODE</u>			<u>RESISTOR</u>		
D1	8-719-812-31	DIODE TLR123	R1	1-247-179-00	CARBON 100K 1/4W
D2	8-719-812-31	DIODE TLR123	R2	1-247-179-00	CARBON 100K 1/4W
D3	8-719-812-31	DIODE TLR123	R3	1-247-179-00	CARBON 100K 1/4W
D4	8-719-812-31	DIODE TLR123	R4	1-247-131-00	CARBON 1K 1/4W
D5	8-719-812-31	DIODE TLR123	R5	1-247-121-00	CARBON 390 1/4W
D6	8-719-812-33	DIODE TLG123A	R6	1-247-131-00	CARBON 1K 1/4W
D7	8-719-812-31	DIODE TLR123	R7	1-247-179-00	CARBON 100K 1/4W
D8	8-719-812-31	DIODE TLR123	R8	1-247-179-00	CARBON 100K 1/4W
D9	8-719-812-31	DIODE TLR123	R9	1-247-179-00	CARBON 100K 1/4W
D10	8-719-812-31	DIODE TLR123	R10	1-247-121-00	CARBON 390 1/4W
D11	8-719-812-31	DIODE TLR123	R901	1-214-594-00	METAL 10 1W
D12	8-719-812-31	DIODE TLR123			
D13	8-719-812-33	DIODE TLG123A			

2. PERIODIC CHECK AND MAINTENANCE

- Carry out the following maintenance and periodic checks in order not only to fully exhibit the functions and performance of the set, but also for the equipment and tape. After repairing, service the set as follows, regardless of the length of use.

2-1 CLEANING OF ROTARY DRUM ASSEMBLY

- 1) Gently apply chamois cloth (Ref. No. J-2) soaked in cleaning liquid (Ref. No. J-1) to the rotary drum assembly.

Clean it by rotating the upper rotary drum assembly slowly counterclockwise by hand.

Note : Do not rotate the motor by power or rotate the upper rotary drum assembly clockwise by hand. Also, the head tip is highly likely to be damaged if the chamois cloth is moved in a perpendicular direction to the it. Make sure to follow the instructions above for cleaning the rotary drum assembly.

2-2 CLEANING OF TAPE PATH (Fig. 7)

- 1) In the EJECT mode, clean the tape running system (TG-1, -2, -3, -4, -5, -6, -7, -8, -9, -10, -11, pinch roller, and capstan shaft) using a superfine applicator (Ref. No. J-3) soaked in the cleaning liquid.

Note : Note that no oil or grease of each link mechanism adheres to the superfine applicator (Ref. No. J-3).

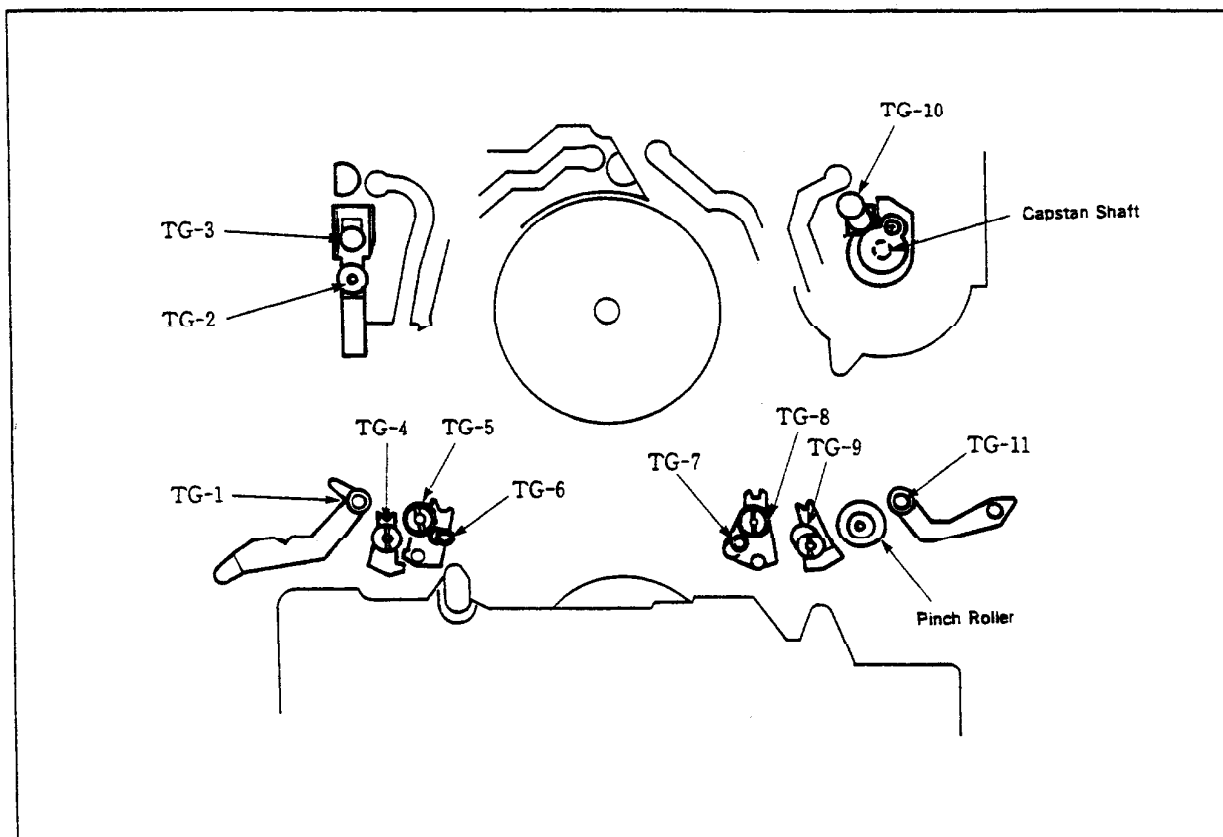


Fig. 7

2-3 PERIODIC CHECK ITEMS

Location of Maintenance and check		Hours of Use (H)										Remarks
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
Tape trans- portion System	Cleaning of tape path surface	○	○	○	○	○	○	○	○	○	○	Be careful of oil
	Cleaning and degaus- sing of rotary assembly	○	○	○	○	○	○	○	○	○	○	Be careful of oil
Driving System	Relay belt	—	☆	—	☆	—	☆	—	☆	—	☆	3-728-212-01
	Capstan shaft	—	◎	—	◎	—	◎	—	◎	—	◎	Be adsolutely careful not to get oil on the tape path surface.
	Relay pulley sheft	—	◎	—	◎	—	◎	—	◎	—	◎	
	Loading motor	—	☆	—	☆	—	☆	—	☆	—	☆	1-541-607-11
Performance Confirmation	Abnormal noise	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	
	Back tension measurement	—	☆	—	☆	—	☆	—	☆	—	☆	
	Brake system	—	☆	—	☆	—	☆	—	☆	—	☆	
	FWD. RVS torque measurement	—	☆	—	☆	—	☆	—	☆	—	☆	

○ : Cleaning ◎ : Oil ☆ : Confirmation

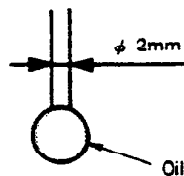
Note : When overhauling, refer to the items above to replace parts.

Note : Concerning oil

- Be sure to use specified oil. (If you use oil with different viscosity, etc., it may cause troubles.)

Oil : Part No. 7-661-018-18 (Mitsubishi Diamond Oil Hydrofluid NT-68)

- When lubricating bearings, be sure use oil free from dust, etc. (If you use oil with dust, etc. contained, it may cause bearings to be worn out or seized.)
- A drip of oil refers to an amount attached to the tip of a ϕ 2mm stick shown in the right figure.

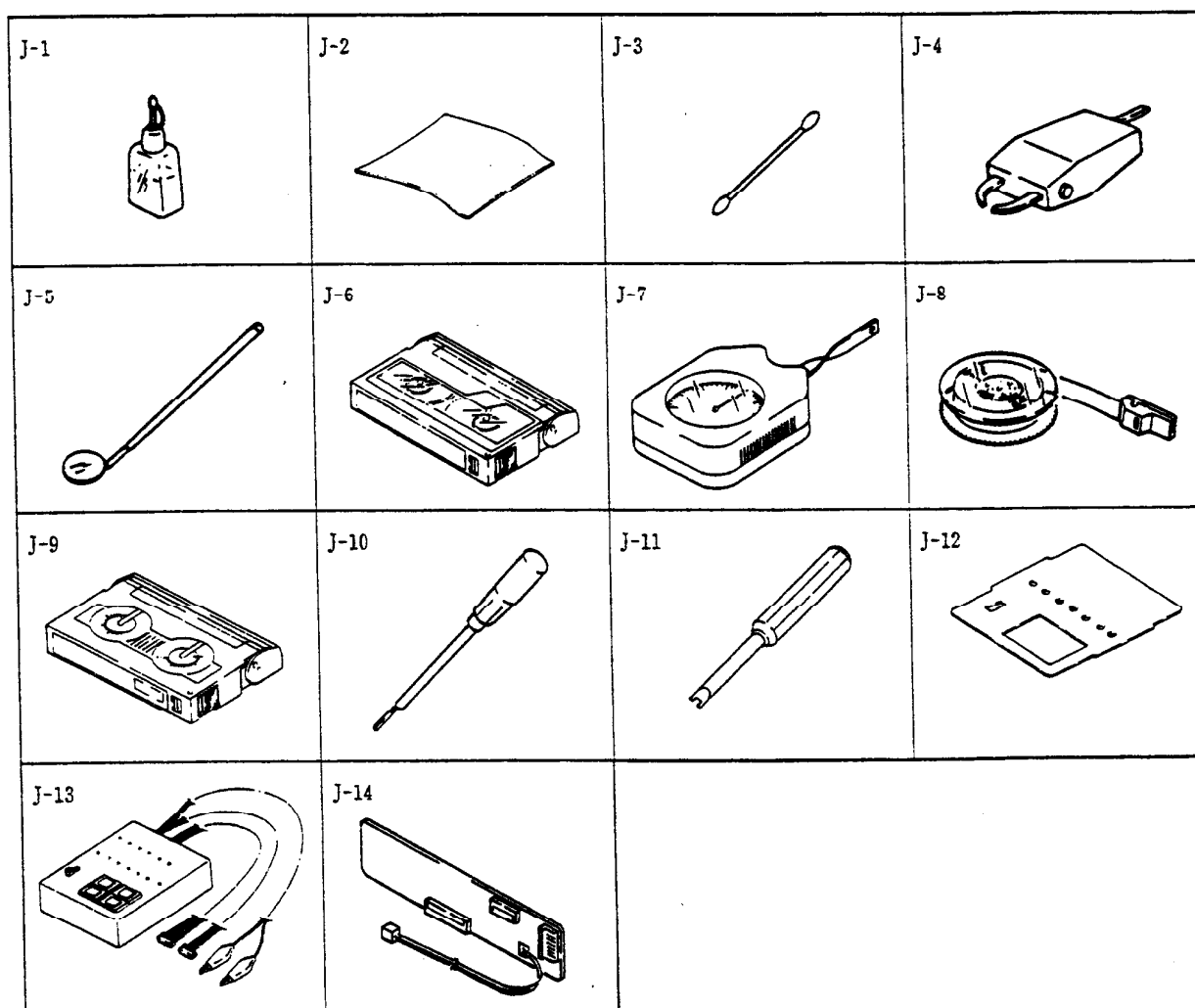


2-4 Service jigs list

Ref. No.	Name	Part No.	Fixture No.	Usage and Others
J-1	Cleasing fluid	Y-2031-001-0	—	
J-2	Cleasing cloth	2-034-697-00	—	
J-3	Super fine applicator (Made by NIPPON APPLICATOR, P752D)		—	
J-4	Head degausser	Widely available	—	
J-5	Small mirror for adjustment Spare mirror	J-6080-029-A J-6080-030-1	SL-5052	Tape path
J-6	Alignment tape NTSC (WR5-1N) PAL (WR5-1C)	8-967-995-01 8-967-995-06		Tape path
J-7	Dial tension gauge	J-6080-827-A		Various torque measurement
J-8	Tension measurement reel	J-6080-831-A		With $\phi 30$ tape
J-9	FWD and RVS winding torque cassette	J-6080-824-A	GD-2086	
J-10	Drum screwdriver (Hexagonal wrench screwdriver)	7-700-766-01		
J-11	Screwdriver for tape path	J-6082-026-A		For tape guide adjustment
J-12	Mode selector III panel	J-6082-023-A		
J-13	Mode selector	J-6080-825-A		For all models
J-14	Mode selector III conversion connector	J 6082 021 A		

Other equipment

- Oscilloscope
- Analog tester (20k Ω)



3. MECHANICAL CHECK, ADJUSTMENT AND REPLACEMENT

Note : Use the mode selector (Ref. No. J-14) for the following mechanical checks, adjustments and replacements.

Note : The modes in are those set by pressing the mode selector buttons.

3-1 LED BASE (Fig. 8)

1. Removal

- 1) Select the USE mode.
- 2) Referring to 1-1, remove the cassette compartment holder assembly.
- 3) As shown in Fig. A, rotate the LED in a direction of the arrow **A** and remove it in a direction of the arrow **B**.
- 4) Remove the three screws **1**, **2** and **3**.
- 5) Lifting the LED base **4**, remove it by pushing it in a direction of the arrow **C**.

Note : Dismount and remount the LED base carefully, because its holder is easily deformed.

2. Mounting

- 1) Select the USE mode.
- 2) Put the claw **5** of the LED base **4** in the notch **6** of the LS chassis without catching the LED in between. Next, fit to the dowels **7** at 2 places.
- 3) Mount and tighten the screws **1**, **2** and **3** in that order.
- 4) As shown in Fig. B, set the LED in a direction of the arrow **A** and rotate it in a direction of the arrow **B** to fix.
- 5) As shown in Fig. C, bend a flexible board and put it in the holder.

Note : In the step2), make sure that the barring **8** of the arm assy, gear can appears in the hole of the LED base. (Fig. D)

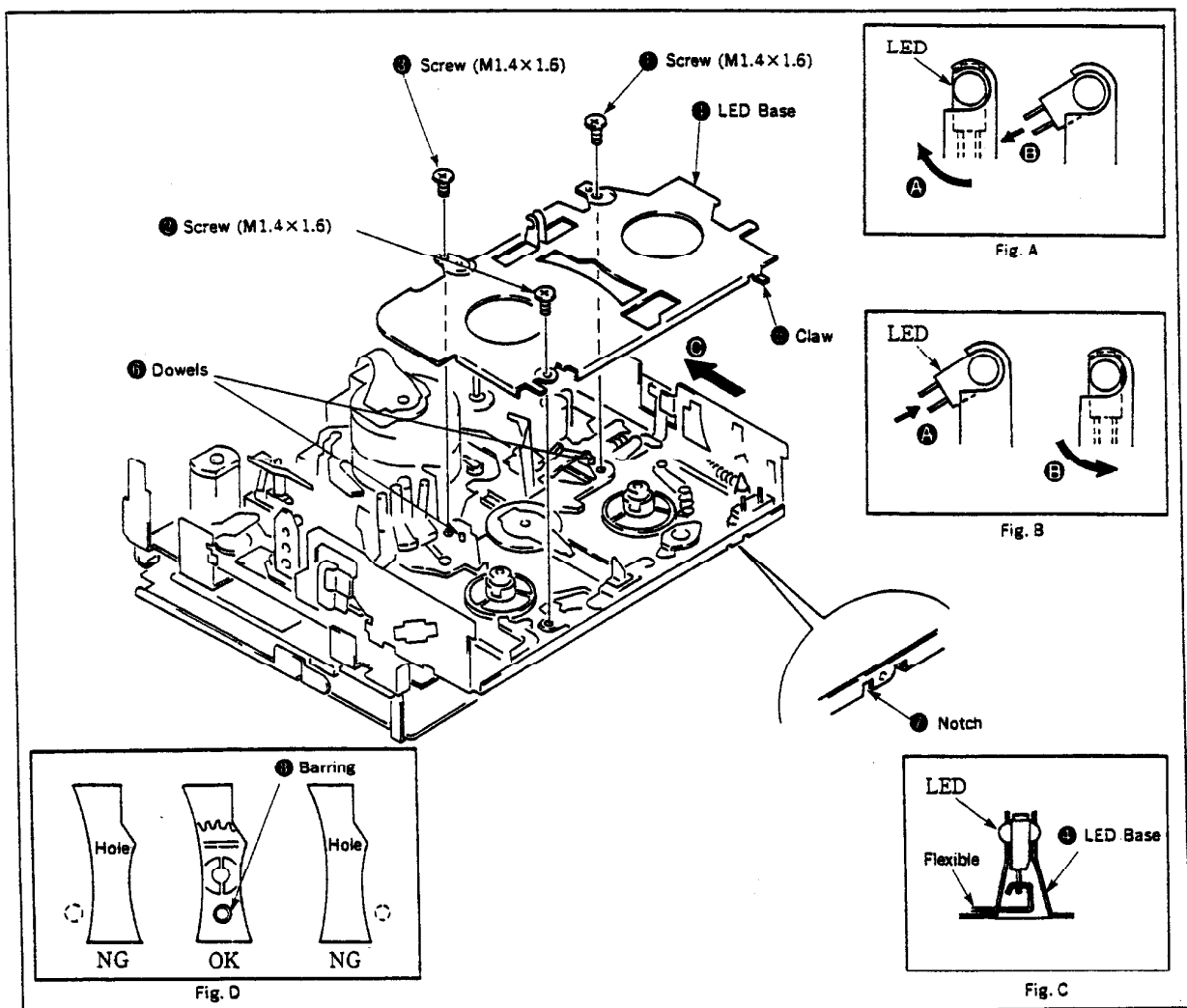


Fig. 8

3-2 RL BASE ASSEMBLY, RETAINER (Fig. 9)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to 1-1, remove the cassette compartment holder assembly.
- 3) Referring to 3-1, remove the LED base.
- 4) Remove the screw ●, and then, retainer ●.
- 5) Remove the screw ●, and then, RL base assembly ●.

2. Mounting

- 1) Select the **USE** mode.
- 2) With the screw ●, mount the RL base assembly ● to the LS chassis.
- 3) With the screw ● fix the retainer ● to the RL base assembly ●.

When this is done, align the bump part * of the retainer ● with the bump part * of the guide rail T. (Fig. A)

- 4) Referring to 3-1, mount the LED base.
- 5) Referring to 1-1, mount the cassette compartment holder assembly.

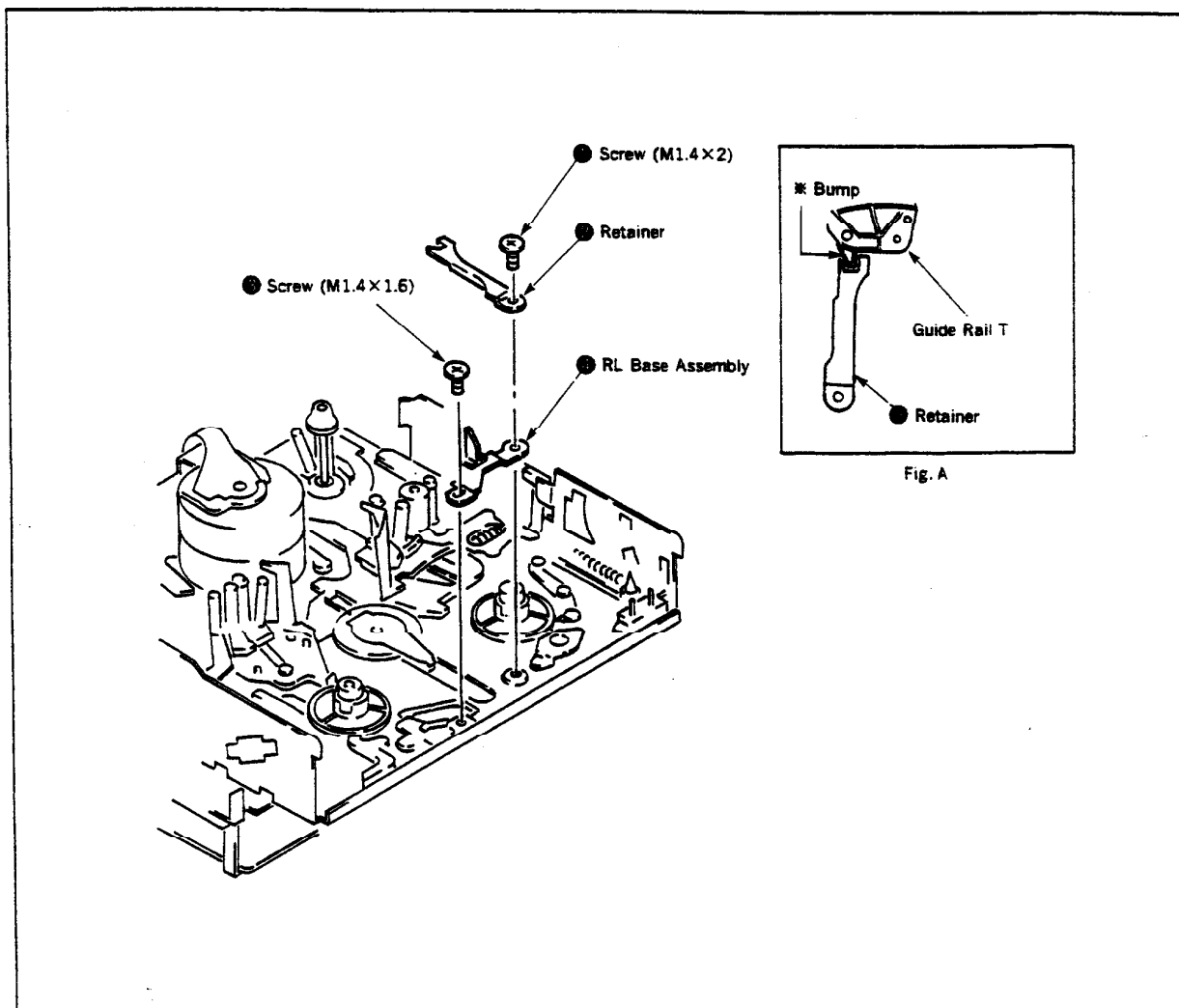


Fig. 9

3-3 TABLE ASSY, REEL, SUPPLY (Fig. 10)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to 1-1, remove the cassette compartment holder assembly.
- 3) Referring to 3-1, remove the LED base.
- 4) As shown in Fig. A, making use of slackness of the tension regulator string ● in the **USE** mode, remove the string out of the groove of the table assy, reel, supply ●. When this is done, be careful not to bend the tension regulator string ● and the S soft arm ● must be moved in a direction of the arrow ③.
- 5) Remove the table assy, reel, supply ●.

Note : Dismount and remount the table assy, reel, supply ●, holding the reel claw *.

2. Mounting

- 1) Select the **USE** mode.
- 2) As shown in Fig. B, move the S soft arm ● in a direction of the arrow ②.
- 3) Avoiding the tension regulator string ●, mount the table assy, reel, supply ● to the shaft ●.
- 4) Put the tension regulator string ● in the groove of the table assy, reel, supply ● and fit it properly by turning the table assy, reel, supply ●.
- 5) Referring to 3-1, mount the LED base.
- 6) Referring to 1-1, mount the cassette compartment holder assembly.

Note : Do not touch the tension regulator string ● with naked hand. Also, be careful of adhesion of grease, etc.

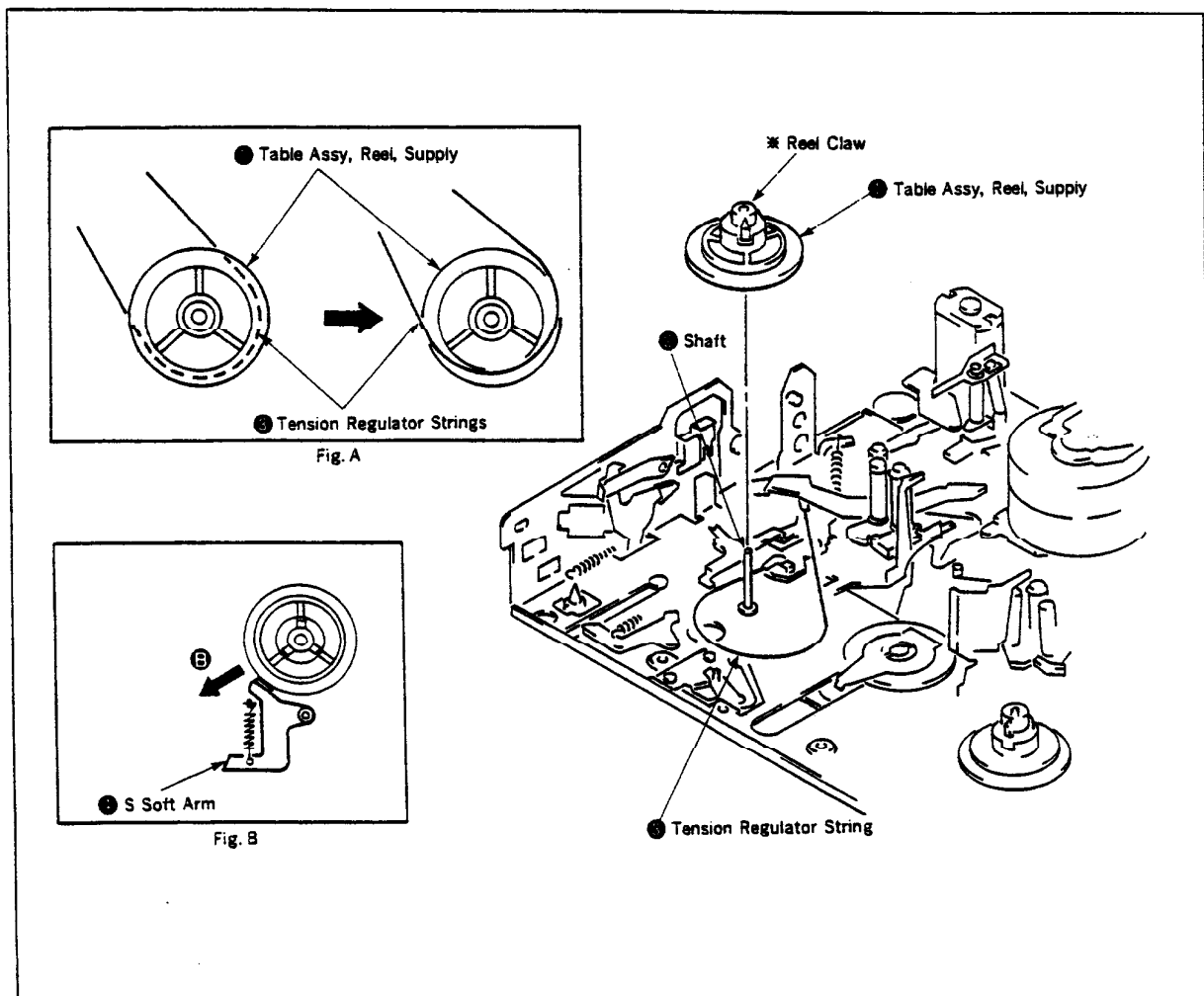


Fig. 10

3-4 TABLE ASSY, REEL, TAKE-UP (Fig. 11)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to 1-1, remove the cassette compartment holder assembly.
- 3) Referring to 3-1, remove the LED base.
- 4) Referring to 3-2, remove the retainer.
- 5) Displace the T ratchet ● in a direction of the arrow **A**.
- 6) With the claw (T ratchet head) of the T ratchet ● moved in a direction of the arrow **B**, remove the Table assy, reel, take-up ●.

2. Mounting

- 1) Select the **USE** mode.
- 2) With the claw (T ratchet head) of the T ratchet ● moved in an arrow direction, mount the Table assy, reel, take-up ● to the shaft ●.
- 3) Referring to 3-2, mount the retainer.
- 4) Referring to 3-1, mount the LED base.
- 5) Referring to 1-1, mount the cassette compartment holder assembly.

Note : Dismount and remount the Table assy, reel, take-up ●, holding the reel claw ※.

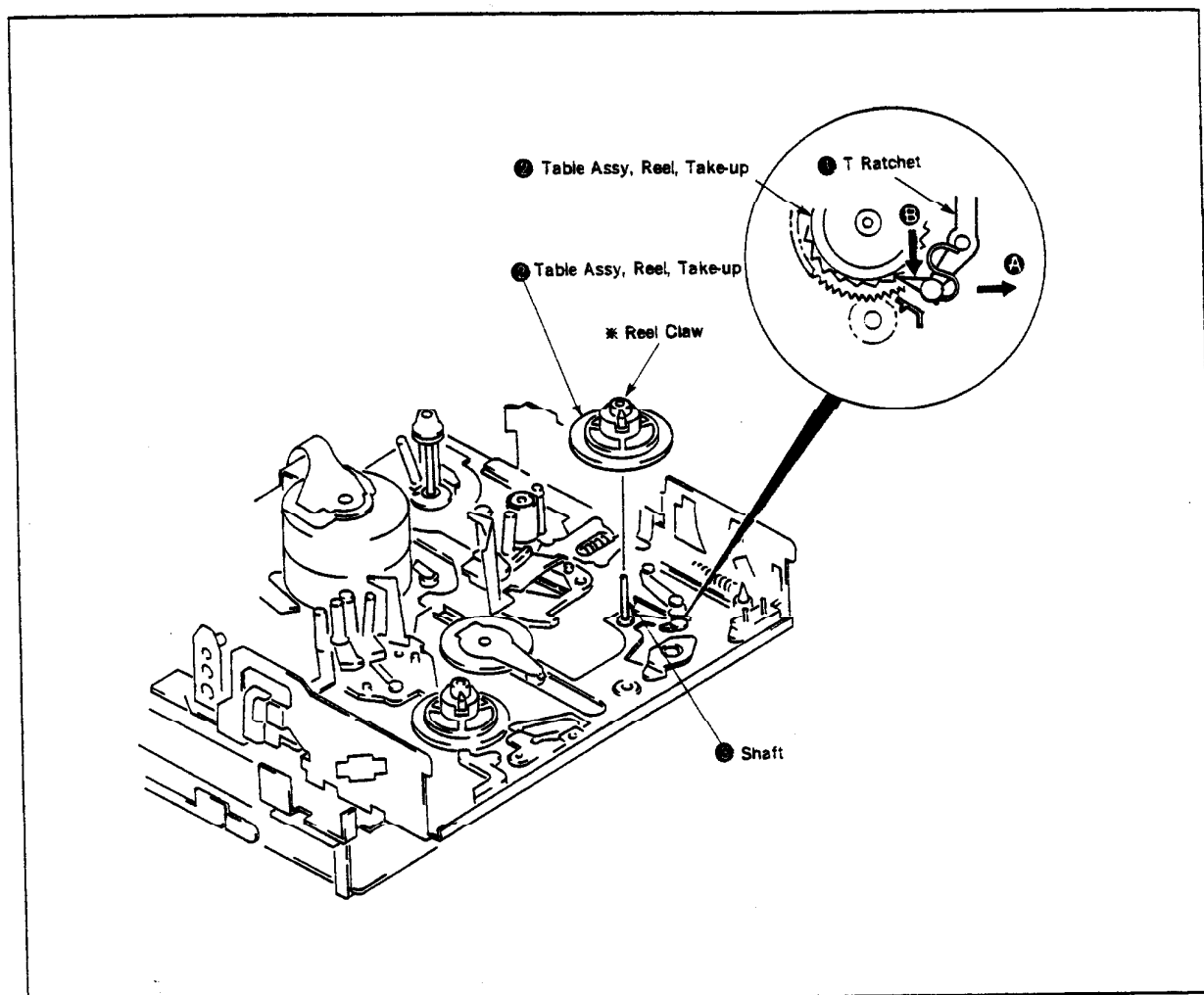


Fig. 11

3-5 ONEWAY CLUTCH ASSEMBLY (Fig. 12)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to the cassette compartment holder assembly.
- 3) Referring to 3-1, remove the LED base.
- 4) Remove the screw ●, and then, oneway clutch assembly ●.

2. Mounting

- 1) Select the **USE** mode.
- 2) Mount the oneway clutch assembly ● to the LS chassis and fix with the screw ●.
- 3) Referring 3-1, mount the LED base.
- 4) Referring to 1-1, mount the cassette compartment holder assembly.

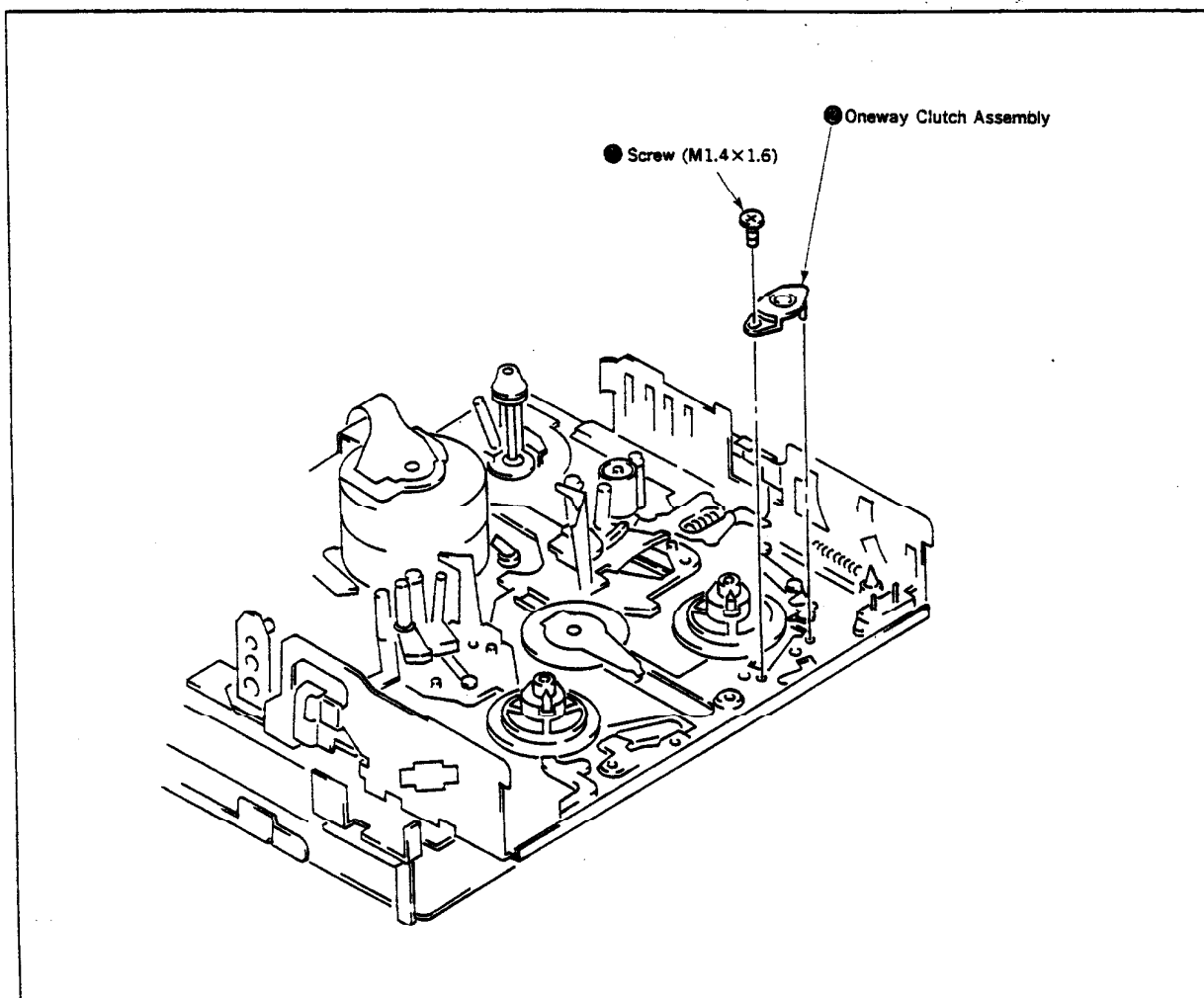


Fig. 12

3-6 S SOFT ARM ASSEMBLY (Fig. 13)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to 1-1, remove the cassette compartment holder assembly.
- 3) Referring to 3-1, remove the LED base.
- 4) Remove the lock washer ●, and then, the spring, tension ●.
- 5) Remove the S soft arm assembly ● by rotating it in an arrow direction (until the hook ● comes off the LS chassis).

2. Removal

- 1) Select the **USE** mode.
- 2) As shown in Fig. A, apply a quarter drip of oil to the arrow-indicated part of the shaft ●.
- 3) Mount the S soft arm assembly ● to the shaft ●, rotating it in as arrow direction. (Be careful not to bend the hook ●.)
- 4) Hook the spring, tension 2 onto the claw and fix it with lock washer 1.
- 5) Referring to 3-1, mount the LED base.
- 6) Referring to 1-1, mount the cassette compartment holder assembly.

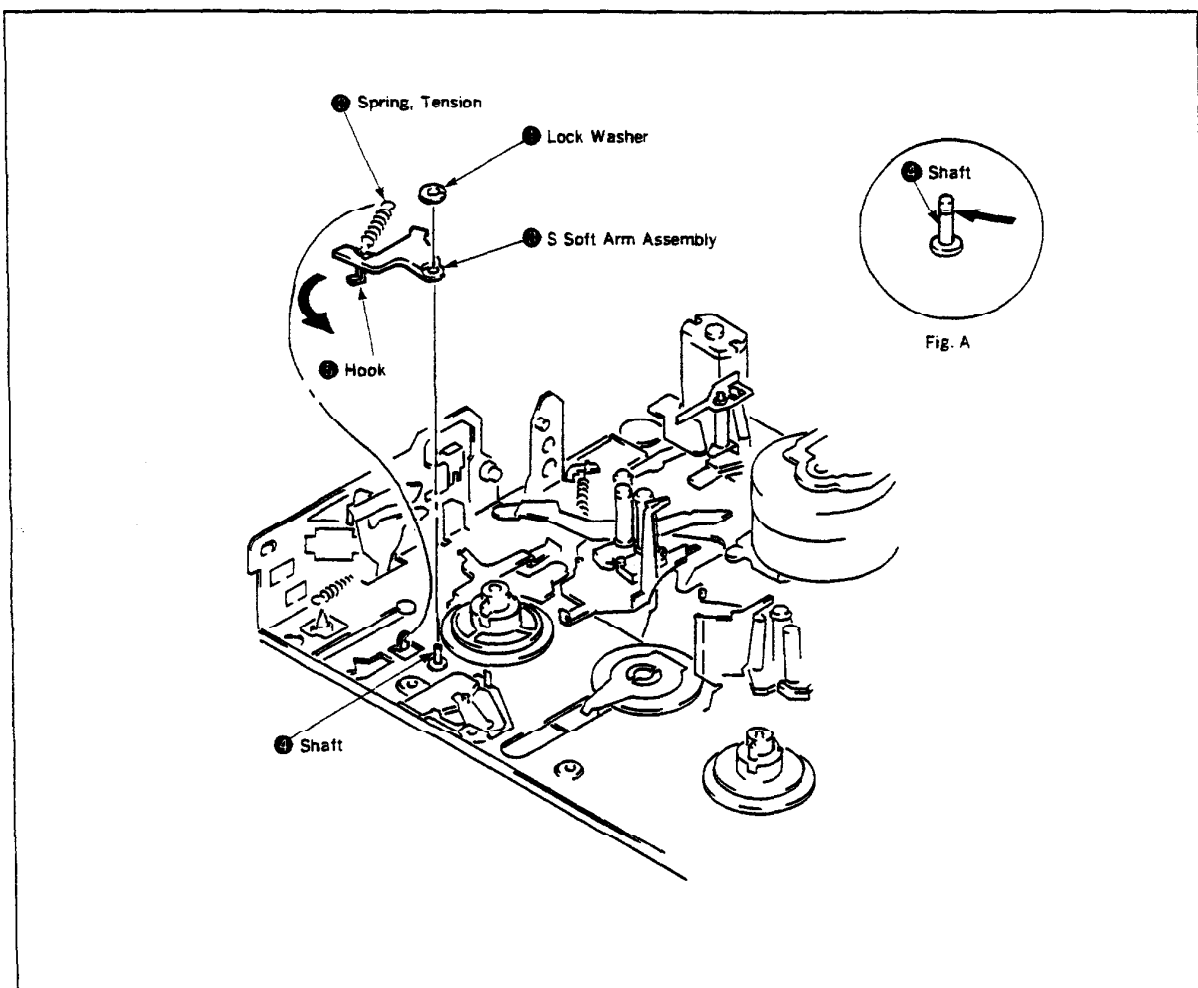


Fig. 13

3-7 LS CHASSIS ASSEMBLY (Fig. 14)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to 1-1, remove the cassette compartment holder.
- 3) Referring to 3-1, remove the LED base.
- 4) Referring to 3-2, remove the RL base assembly and retainer.
- 5) Remove the lock washer ●, and then, arm assy gear ●.
- 6) Select the **Q, REW** mode.
- 7) Remove the flexible rotary shaft ●, and then, the flexible connector ●.
- 8) Remove the E retaining ring ● and three screws ●.
- 9) Remove the LS chassis assembly ● in a direction of the arrow ●.

2. Mounting

- 1) As shown in Fig. A, apply Molyton grease to the arrow-indicated part of the LS chassis assembly ●.
- 2) Unload in the RDY mode. Start docking in the **Q, REW** mode after first GL. When docking the mechanical chassis and LS chassis assembly ●, it is necessary to place the following parts at specified positions.
- 3) Put the pin ● of the pinch arm assembly ● into the left side of the pinch press arm assembly ●. (Fig.19)
- 4) Move the TG-1 arm assembly ● in a direction of the arrow ● to put the pin ● into the concave of the arm assembly ●. (Fig. 17)
- 5) put the pin ● of the S ratchet ● into the right side the of the arm assembly ●. (Fig. 17)

Simultaneously performing the operations above, push the roller of the guide lock arm ● With the arm arc portion of the guide arm T assembly ● (Fig.15) to push the LS chassis assembly ● in a direction of the arrow ●, and at the same time, engage the claws of the guide rail base 1 ●, guide rail base 2 ● and guide rail base 3 ● with those of the guide rail S ● and guide rail T ●. (Fig. 16)

Then, align the shafts ● of the mechanical chassis With the four long joints of the LS chassis assembly ●, and put the LS pin ● of the LS arm assembly ● in the groove of the LS cam plate ●. (Fig.18)

Note : Before docking, confirm that both EJ arm and LS arm are deeply inserted into the shafts. (If not properly fit, the set does not function even if the LS chassis is docked.

- 6) Mount the E retaining ring ● and three screws ●.
- 7) Mount the flexible rotary shaft ● and flexible connector ●.
- 8) Select the **USE** mode
- 9) Mount the arm assy gear ● and fix with the lock washer ●.
- 10) Referring to 3-2, mount the RL base assembly and retainer.
- 11) Referring to 3-1, mount the LED base.
- 12) Referring to 1-1, mount the cassette compartment holder assembly.

Note : Using the mode selector, confirm that loading and unloading are performed smoothly.

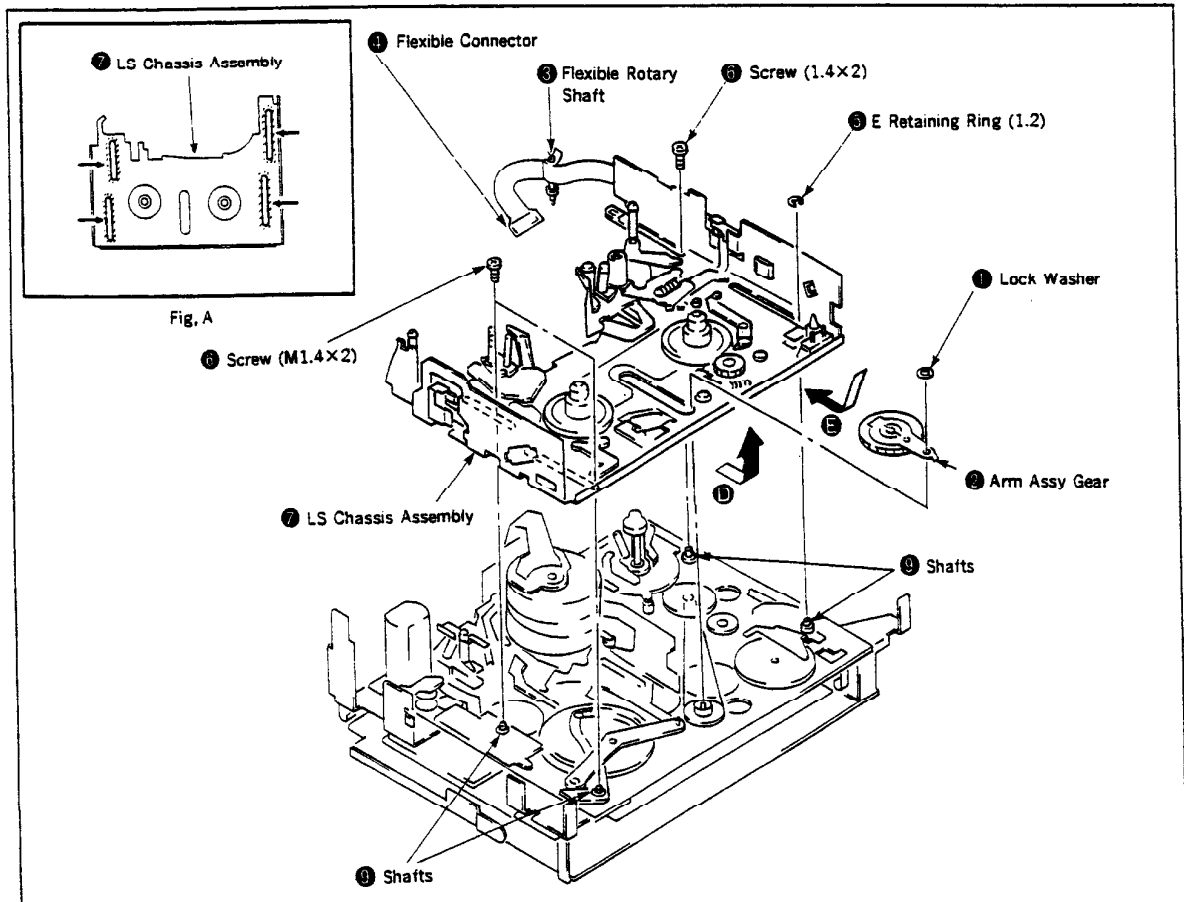


Fig. 14

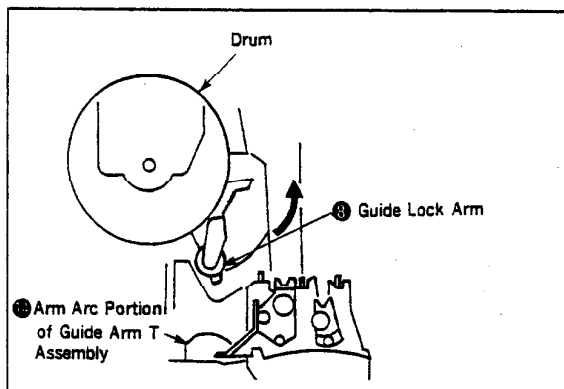


Fig. 15

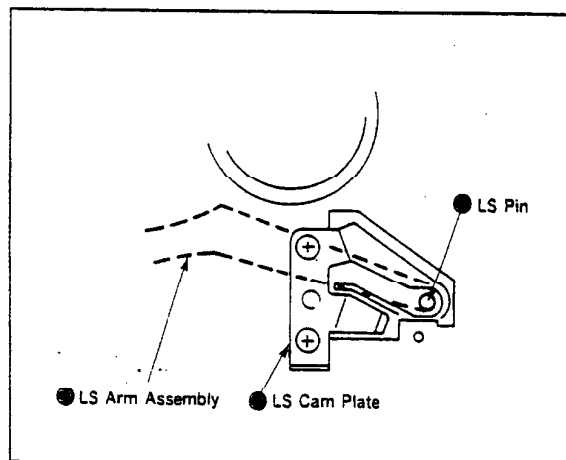


Fig. 18

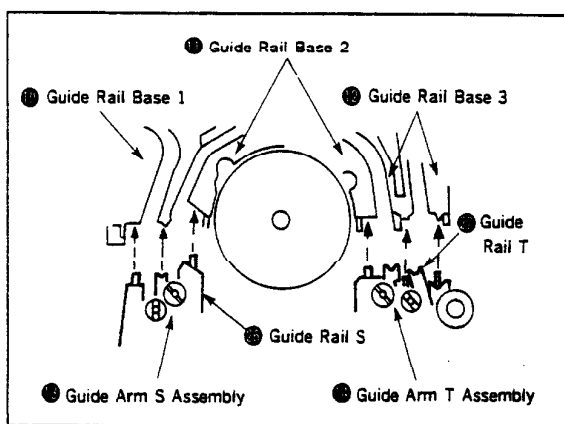


Fig. 16

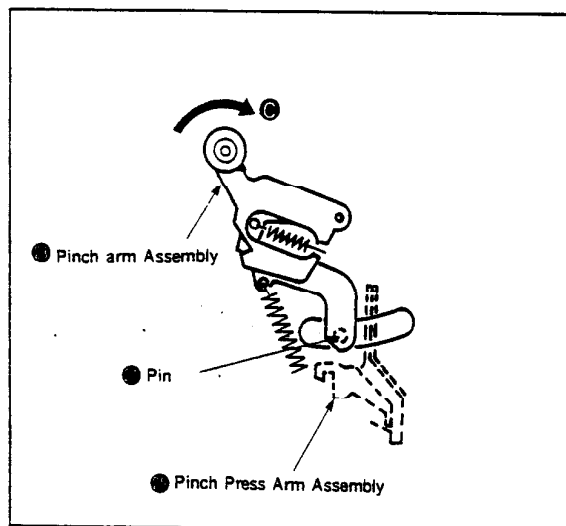


Fig. 19

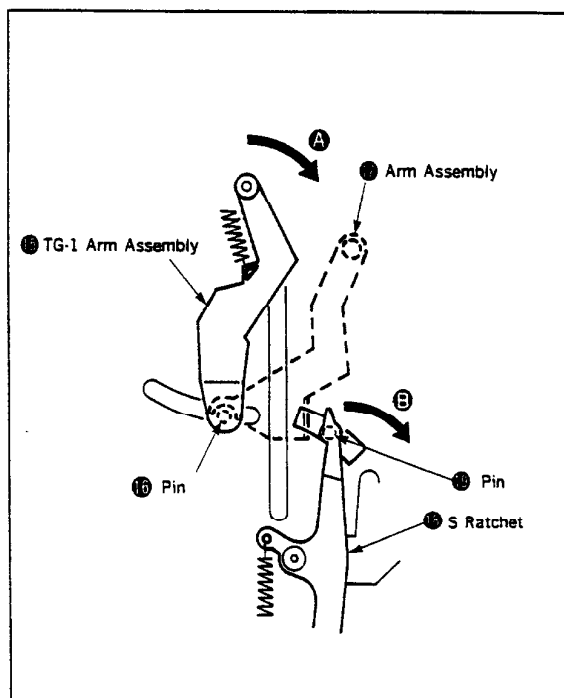


Fig. 17

4-8 PINCH ARM ASSEMBLY (Fig. 20)

.. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis assembly.
- 3) Remove the lock washer ② from the back of the LS chassis assembly ①.
- 4) Remove the spring, tension ③, and then, pinch arm assembly ④.

2. Mounting

- 1) As shown in Fig. A, apply oil to the hole of the boss ⑤ over one third of a drip up to half a drip.
- 2) put the rotation center of the pinch arm assembly in the boss ⑤ hole, and the pin ⑥ in the long hole.
- 3) Hook the spring, tension ③ onto the upper groove of the pinch return spring shaft ⑦.
- 4) Mount the lock washer ② from the back of the LS chassis assembly ①.
- 5) Referring to 3-7, mount the LS chassis assembly.
- 6) Referring to 1-1, mount the cassette compartment holder assembly.

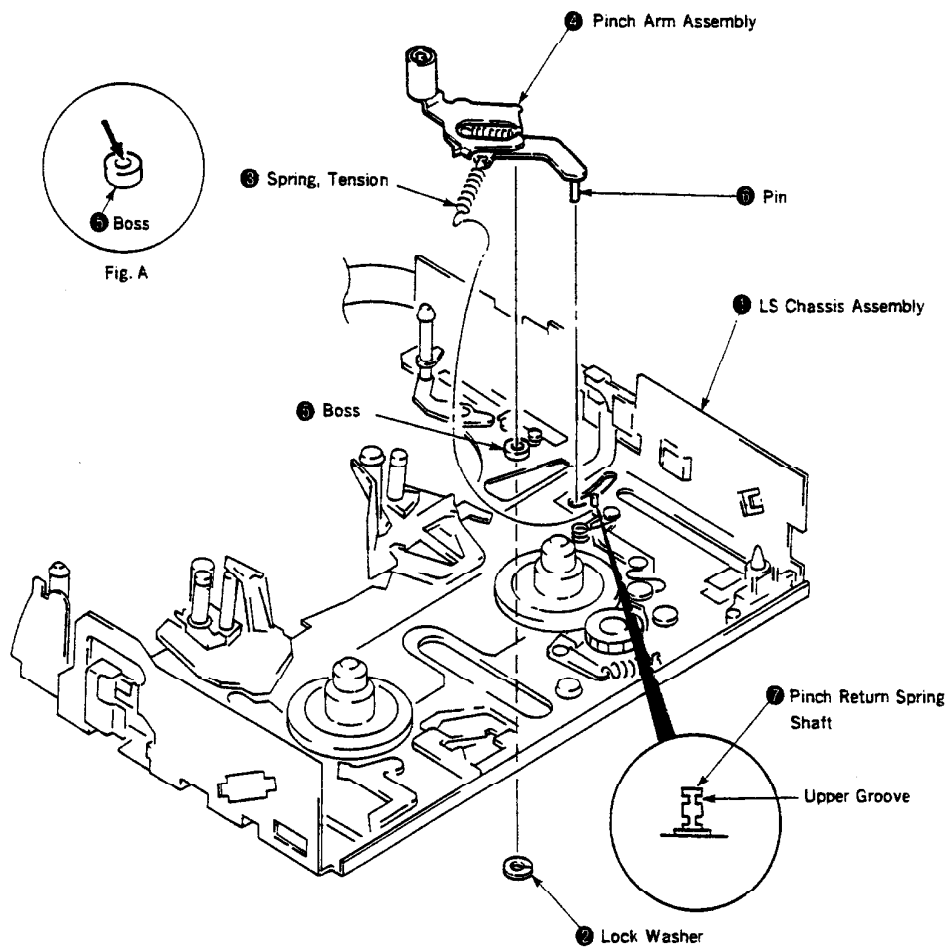


Fig. 20

3-9 TG-11 ARM ASSEMBLY (Fig. 21)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis assembly.
- 3) Remove the lock washer ② from the back of the LS chassis assembly ①.
- 4) Remove the TG-11 arm assembly ③ and spring, torsion ④.

Note : Be careful not to deform the TG-11 arm.

2. Mounting

- 1) As shown in Fig. A, apply oil to a boss hole over one third of a drip up a half a drip.
- 2) As shown in Fig. B, put the longer arm of the spring, torsion ④ between the pinch arm boss ⑤ and cam slider shaft ⑧ of the LS chassis. Next, Hook the shorter arm of the spring, torsion ④ around the pin ⑥ of the TG-11 arm assembly ③, rotate the TG-11 arm assembly and fix with the lock washer ②. When this is done, see to it that the pin ⑥ of the TG-11 arm assembly ③ is located to the left side of the cam slider ⑨ as shown in Fig. C.
- 3) Referring to 3-7, mount the LS chassis.
- 4) Referring to 1-1, mount the cassette compartment holder.

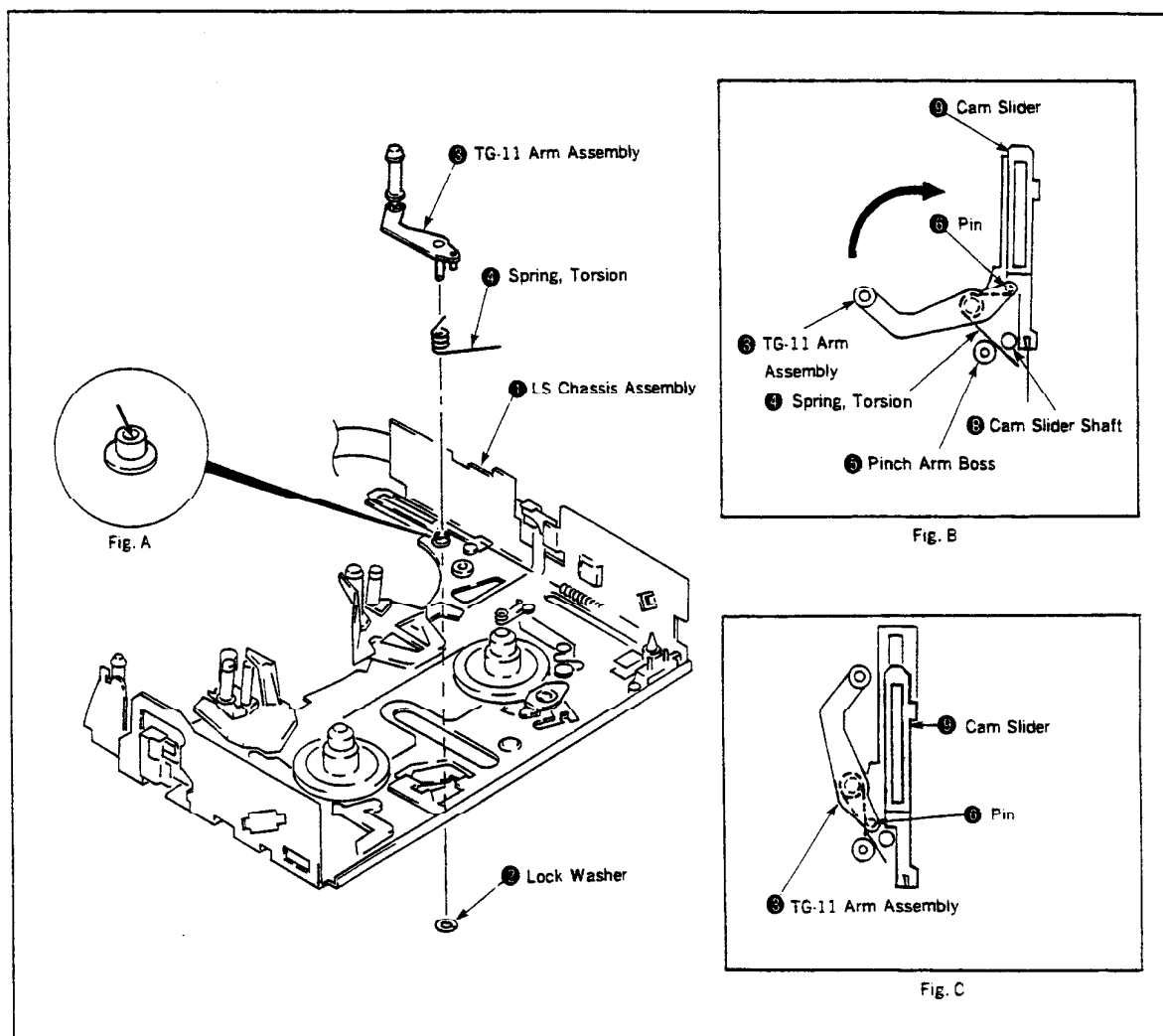


Fig. 21

3-10 TG-1 ARM ASSEMBLY (Fig. 22)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis.
- 3) Referring to 3-3, remove the table assy, reel, supply.
- 4) Remove the lock washer ② from the back of the LS chassis assembly ①.
- 5) Remove the spring, tension ③. Remove the string joint ④ from the dowel ⑤ of the TG-1 adjustment block ⑥ by rotating it in a direction of the arrow A as shown in Fig. C.
- 6) Remove the TG-1 arm assembly ⑦.

Note : Dismount and remount the string joint ④ carefully not to deform it.

2. Mounting

- 1) As shown in Fig. A, apply oil to the hole of the boss ⑦ over one third of a drip up to half a drip.
- 2) As shown in Fig. C, mount the string joint ④ to the TG-1 adjustment block ⑥ in the opposite direction of the arrow A.
- 3) Mount the TG-1 arm assembly ⑦ to the boss ⑦ in such a manner not to touch the guide and insert the pin ⑧ into the long hole.
- 4) Hook the spring, tension ③ onto the position shown in Fig. B.
- 5) Mount the lock washer ② from the back of the LS chassis assembly ①.
- 6) Referring to 3-3, mount the table assy, reel, supply.
- 7) Referring to 3-7, mount the LS chassis assembly.
- 8) Referring to 1-1, mount the cassette compartment holder assembly.

Note : Referring to 3-27, adjust a tension regulator position.

Note : Referring to 3-28, adjust a FWD back tension.

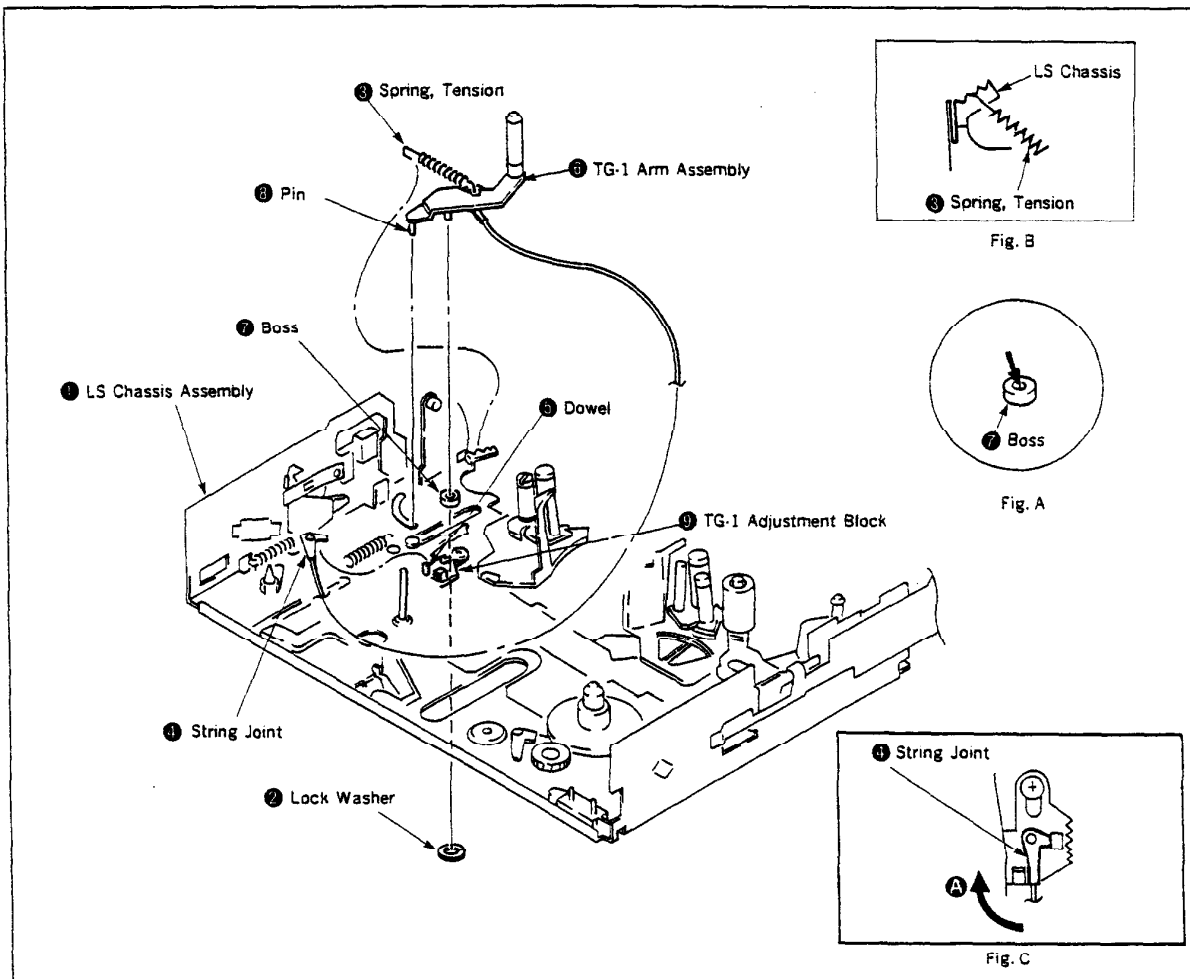


Fig. 22

3-11 STRING JOINT (Fig. 23)

1. Removal

- 1) Referring to 3-10, remove the TG-1 arm assembly ①.
- 2) Remove the joint holder ②, and then, string assembly ③.

2. Mounting

- 1) Put the dowel ④ of the TG-1 arm assembly ① into the hole of the string assembly ③ and mount the joint holder ②. (Apply screw lock between the joint holder and TG-1 arm assembly.)
- 2) Referring to 3-10, mount the TG-1 arm assembly ①.

Note : Be careful not to bend the string assembly ③.

Note : Do not touch the guide *.

Note : The joint holder ②, which was removed once, must not be used again.

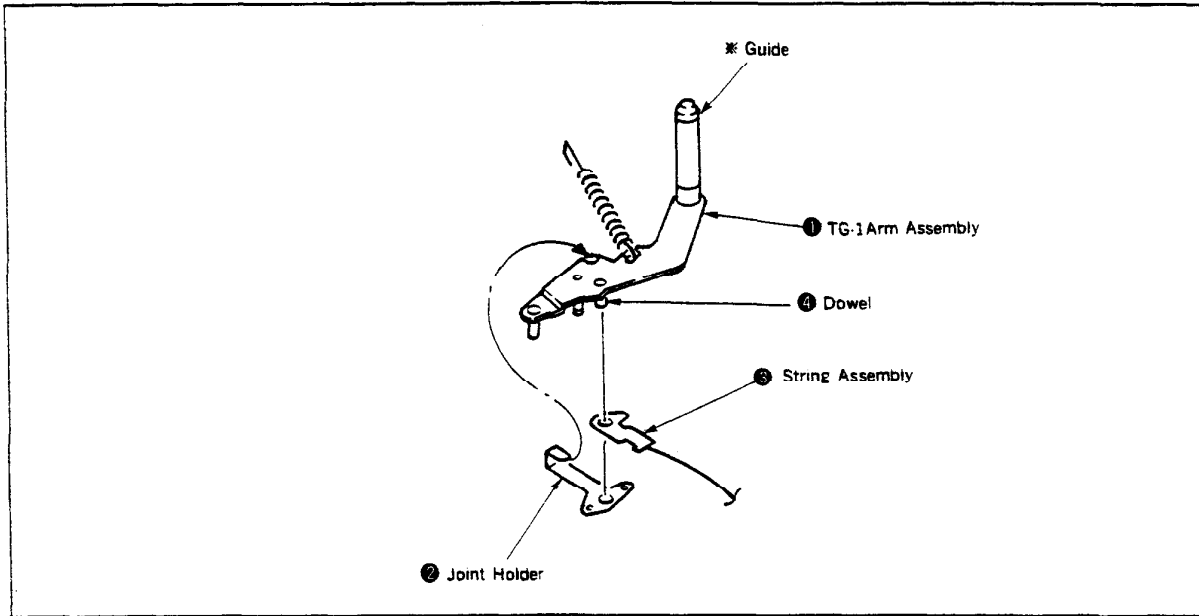


Fig. 23

3-12 GUIDE ARM T ASSEMBLY, GUIDE ARM S ASSEMBLY

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis assembly.
- 3) Rotate the guide arm T assembly ① and guide arm S assembly in arrow directions respectively, align their shafts ③ with the holes as shown in Fig. A, and remove them. (Fig. 24)

Note : Do not touch the guide *. (Fig. 25 and Fig. 26)

2. Mounting

- 1) After inserting the guide arm T and S assemblies in the reverse order of removal, rotate them in the opposite directions of the arrows respectively.
- 2) Fit the TG-7 base assembly ⑤ and TG-9 base assembly ⑥ in the grooves of the guide rail T ④. (Fig. 25)
- 3) Put the shaft ③ flange in the long groove of the guide rail S ⑤, and fit the TG-4 base assembly ⑧ and TG-6 base assembly ⑦ into the right and left grooves of the guide rail S ⑤ respectively.
When this is done, see to it that the flat spring of the TG-6 base assembly ⑦ is located below the guide rail S ⑤ as shown in Fig. B. (Fig. 26)
- 4) Referring to 3-7, mount the LS chassis assembly.
- 5) Referring to 1-1, mount the cassette compartment holder assembly.

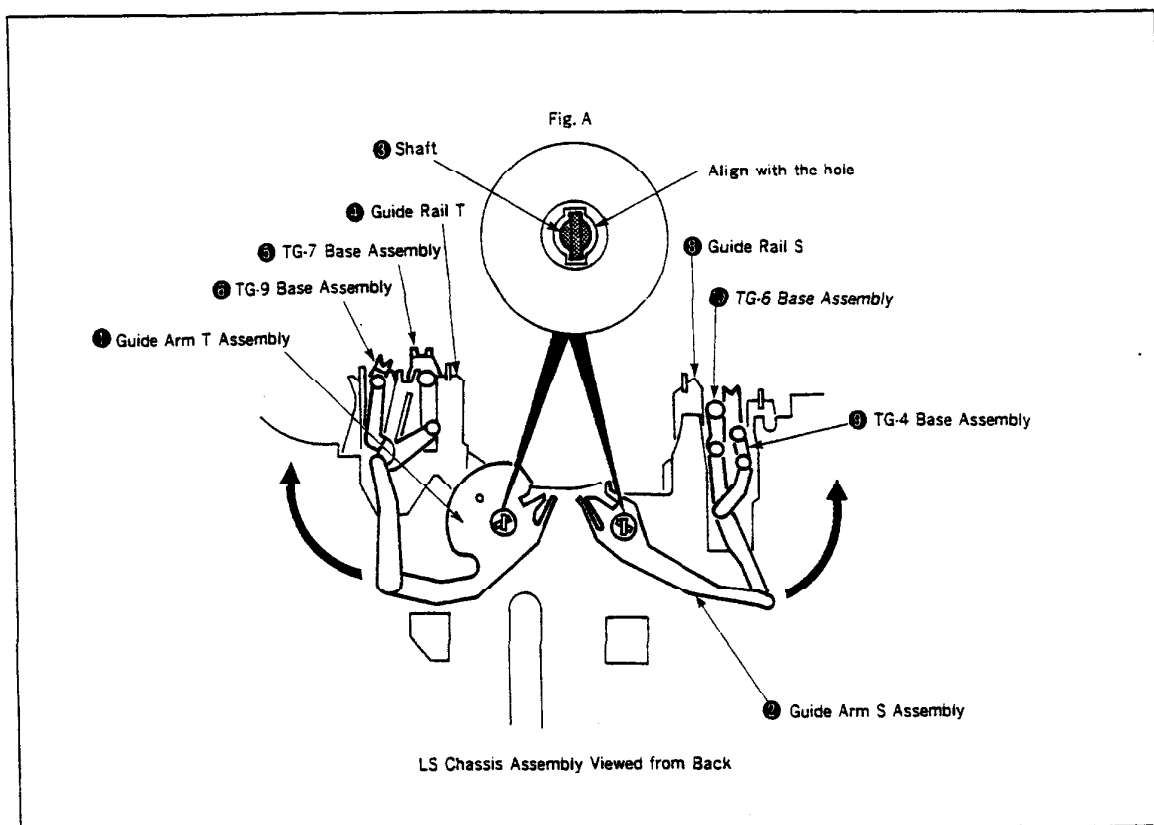


Fig. 24

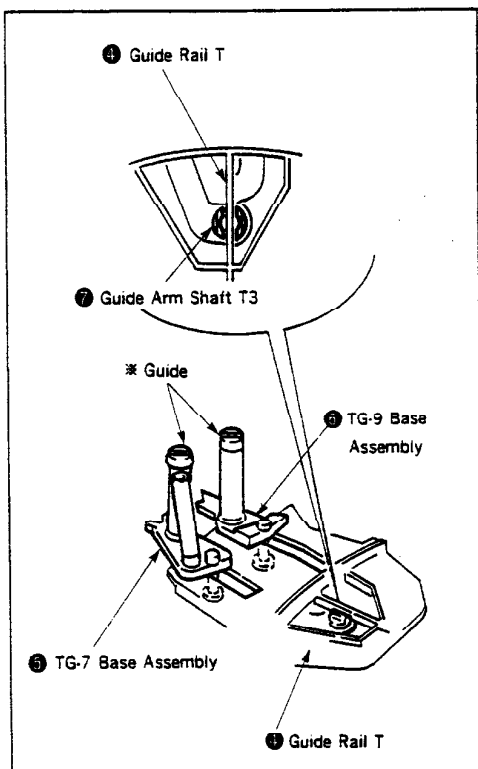


Fig. 25

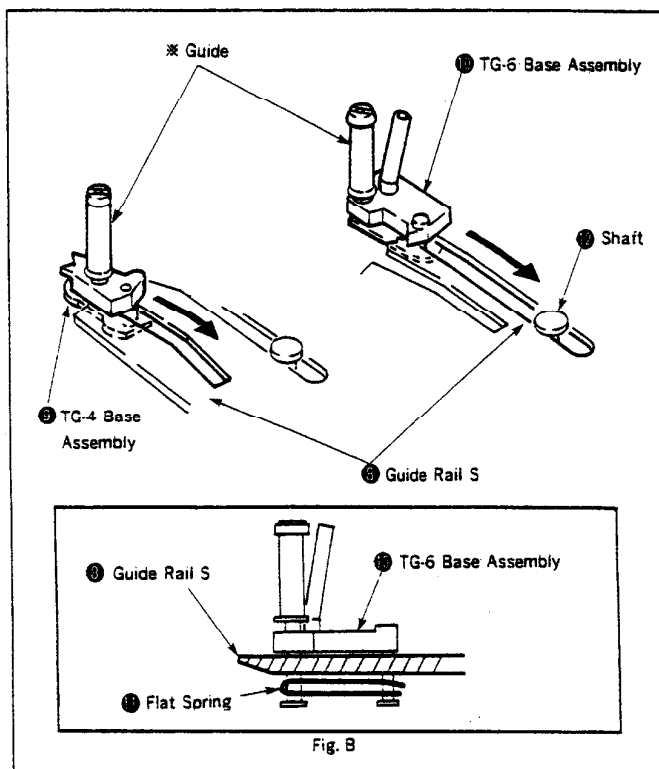


Fig. B

Fig. 26

13 PINCH PRESS ARM ASSEMBLY (Fig. 27)

Removal

Referring to 1-1, remove the cassette compartment holder assembly.

Referring to 3-7, remove the LS chassis.

Remove the screw ①, and then, pinch press arm assembly ②.

2. Mounting

- 1) As shown in A, apply half a drip of molyton grease to an arrowindicated part of a boss hole.
- 2) As shown in Fig. B, apply half a drip of molyton grease each to the pinch press arm assembly ② at 3 places.
- 3) Put the pin ④ of the pinch press arm assembly ② in the groove of the cam B ③.
- 4) Fix. with the screw ①.
- 5) Referring to 3-7, mount the LS chassis assembly.
- 6) Referring to 1-1, mount the cassette compartment holder assembly.

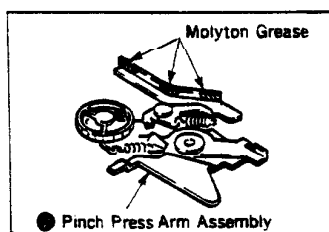


Fig. B

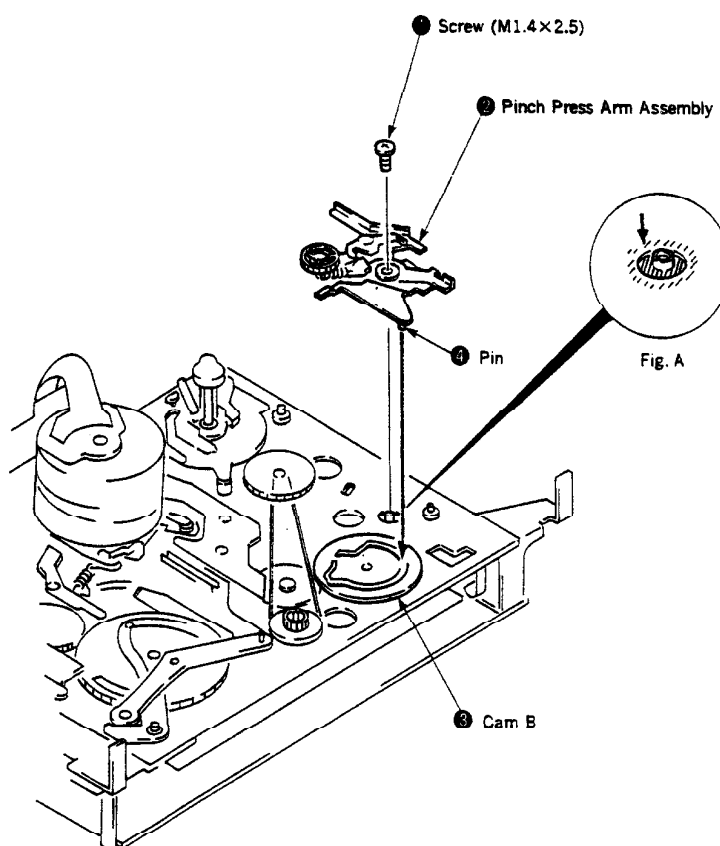


Fig. 27

3-14 GL SLIDER ASSEMBLY (Fig. 28)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis assembly.
- 3) Referring to 3-15, remove the cam A.
- 4) Shift the GL slider assembly ② in a direction of the arrow A.
- 5) Remove the screw ①, and then, GL support S ②.
- 6) Remove the lock washer ③, and then, GL slider assembly ②.

2. Mounting

- 1) Fit the claw ④ of the GL slider assembly ② in the groove of the GL support T ⑦, and put the roller ⑤ in the long hole of the chassis.
- 2) Stop with the lock washer ③.
- 3) Shift the GL slider assembly ② in a direction of the arrow A.
- 4) Fit the claw ④ of the GL support ② in the part of the chassis marked with * and place the dowel ⑥ in the hole of the chassis.
- 5) Fix with the screw ①.
- 6) Referring to 3-7, mount the LS chassis assembly.
- 7) Referring to 1-1, mount the cassette compartment holder assembly.

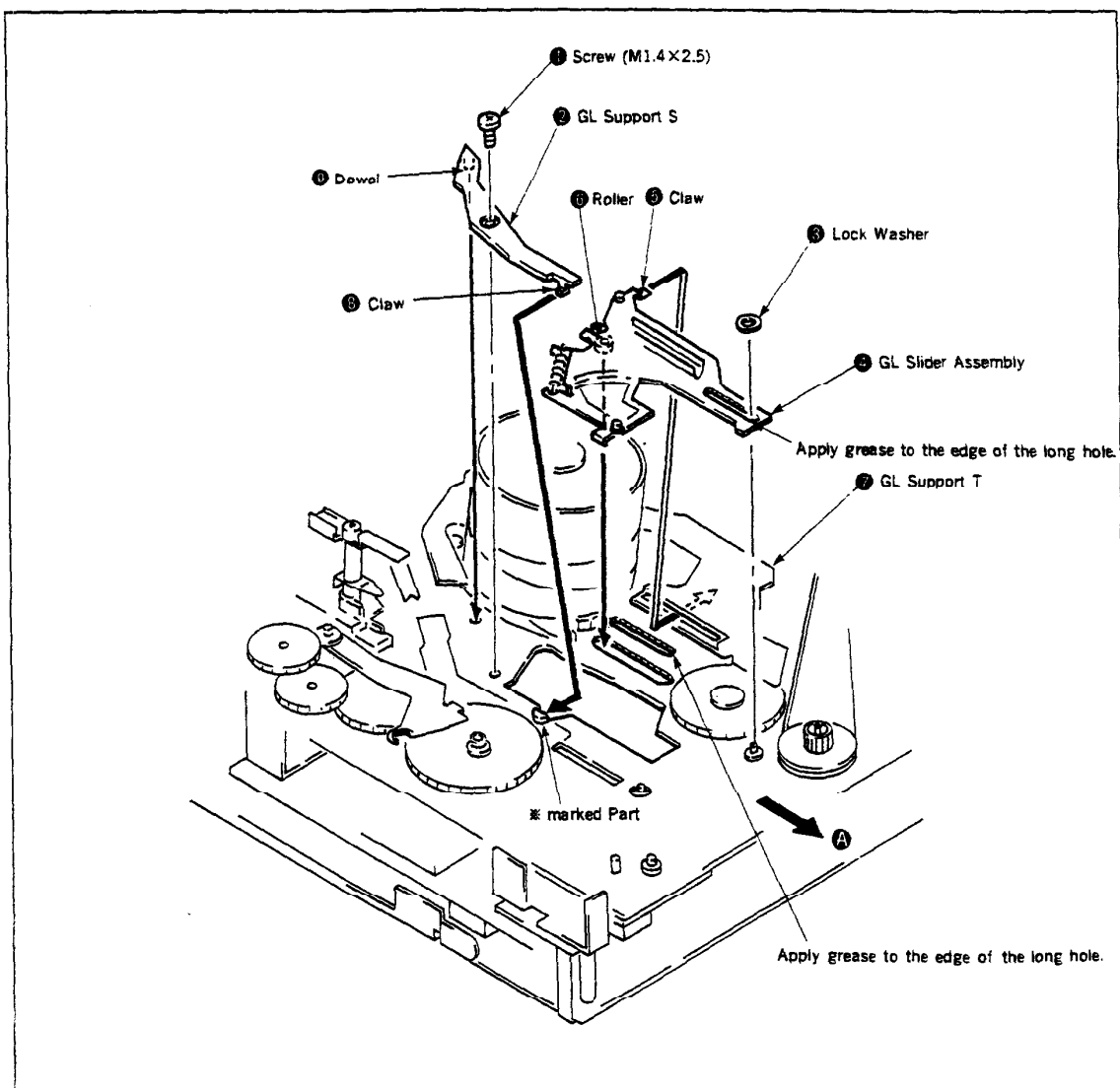


Fig. 28

3-15 PHASE ADJUSTMENT(Fig. 29)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis. (When this is done, one of the BLANK, REC and READY modes must be selected.)
- 3) Remove the two screws ②, and remove the TG-1 cam base ③ by moving it in a direction of the arrow ④. (Remove the notch ⑤ from the groove of the No. 3 gear shaft.)
- 4) Remove the screw ⑥, and remove the gear retainer ⑦ by sliding it in a direction of the arrow ⑧.
- 5) Remove the arm assembly ⑨, No. 0 gear ⑩, No. 1 gear assembly ⑪, No. 2 gear assembly ⑫, No. 3 gear assembly ⑬, lock washer ⑭, and then, mode gear assembly ⑮, respectively.
- 6) Being careful not to lose the LS roller ⑯ of the LS arm, remove the LS arm assembly ⑰ and EJ arm ⑱, respectively.
- 7) Remove the screw ⑲, and then, cam A ⑳.
- 8) Referring to 3-13 3), remove the pinch press arm assembly.
- 9) Remove the screw ㉑, and then, cam B ㉒.

2. Adjustment and Mounting

- 1) Face the hole ㉓ of the mode gear assembly ㉔ to a direction of the arrow ㉕, move the GL slider assembly ㉖ in a direction of the arrow ㉗, apply molyton grease to the pin of the GL slider assembly ㉘, and mount the LS roller ㉙. (Fig. 30)
- 2) Set a direction of the cam A ㉚ so that the hole ㉛ of the cam A ㉚ will be aligned with the hole of the mechanical chassis. (Fig. 31)
- 3) Move the GL slider ㉜ so that the LS roller ㉙ will be placed into the groove ㉝ of the cam A ㉚. At the same time, engage the mode gear assembly ㉔ with the gear of the relay gear A ㉞, and mount the cam A ㉚. Insert a stick of about $\phi 1.5\text{mm}$ in the hole ㉟ of the cam A ㉚. (Fig. 31)
- 4) Align the hole ㊱ of the cam B ㊲ with the hole of the mechanical chassis. At the same time, engage the relay gear B ㊳ with the gear and mount it. (Fig. 32)
- 5) Referring to 3-13, mount the pinch press arm assembly.
- 6) Align the hole ㊴ of the No. 3 gear assembly ㊵ with the hole of the mechanical chassis, and at the same time, engage the mode gear assembly ㉔ with the gear to mount. (Fig. 33)
- 7) Mount the No. 2 gear assembly ㊶, No. 1 gear assembly ㊷ and No. 0 gear ㊸ in that order. Mount the arm assembly ㉖ to the shaft and put the pin ㉘ in the groove of the No. 3 gear assembly ㊵, (Fig. 34)
- 8) Put the TG-1 cam base ③ in place, fit the notch ⑤ to the shaft and shift it in an arrow direction, and mount the screws ② and ⑲ in that order. (Fig. 35)
- 9) Put the gear retainer ⑦ in place, slide it in an arrow direction and fix it with the screw ⑥. (Fig. 36)
- 10) Seeing to it that the EJ arm ⑱ and the LS roller ⑯ of the LS arm assembly ⑰ are put in the groove ㉝ of the cam A ㉚, mount them in that order. (Fig. 29 and Fig. 30)
- 11) Referring to 3-7, mount the LS chassis assembly.
- 12) Referring to 1-1, mount the cassette compartment holder assembly.

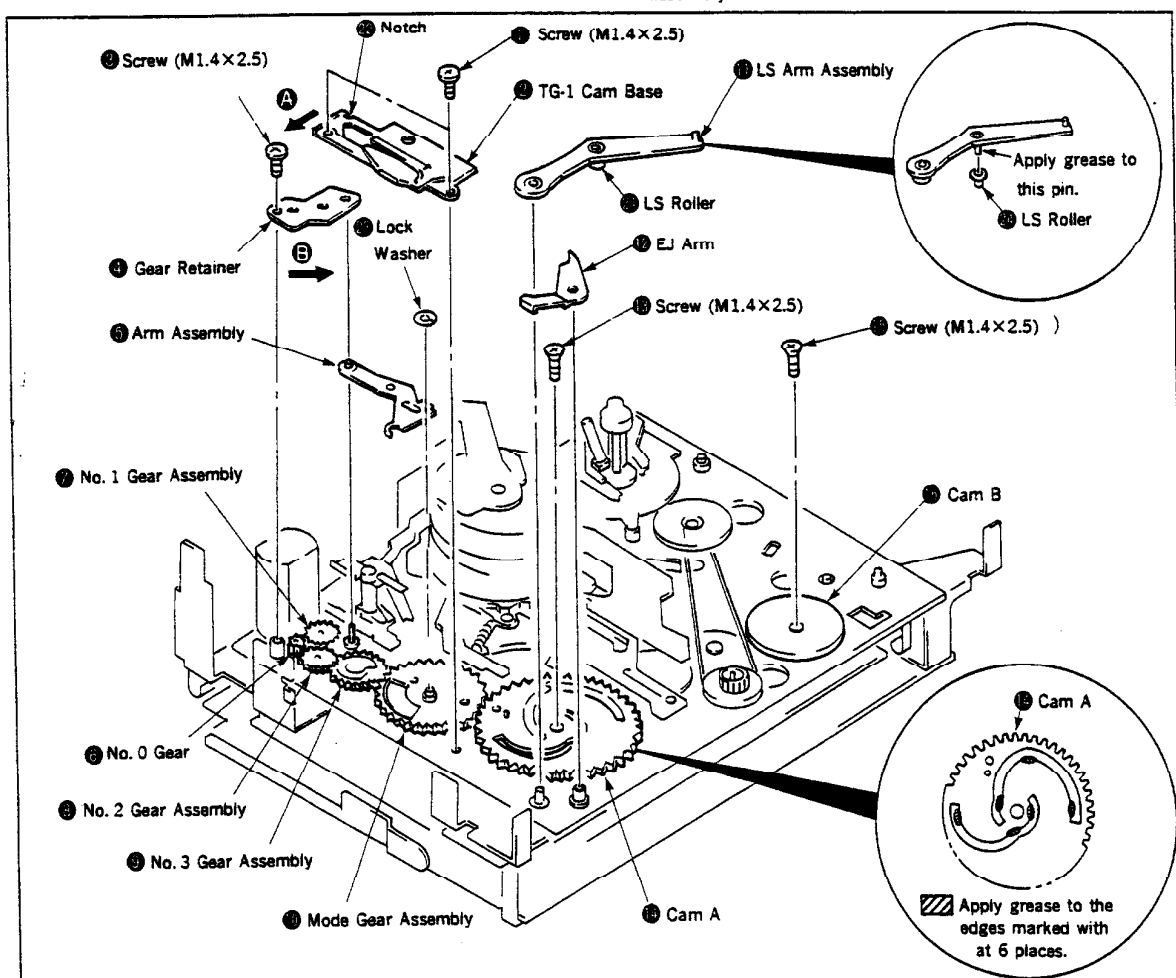


Fig. 29
-27-

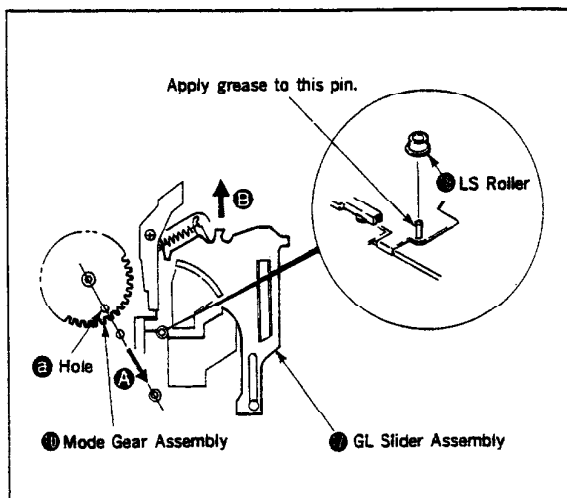


Fig. 30

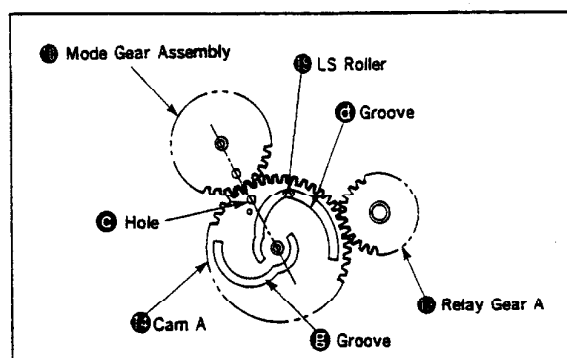


Fig. 31

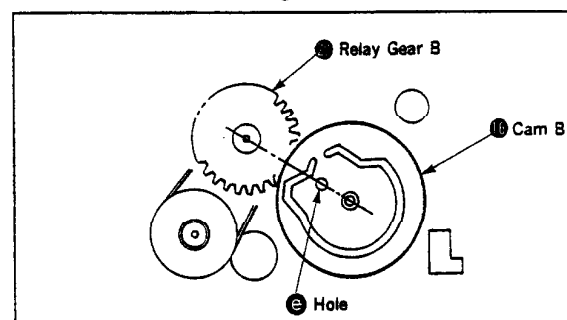


Fig. 32

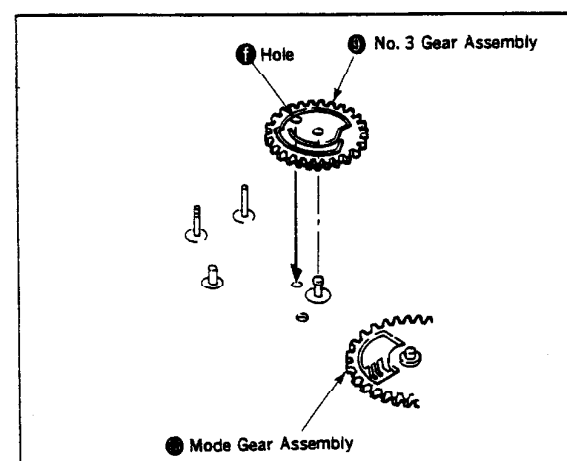


Fig. 33

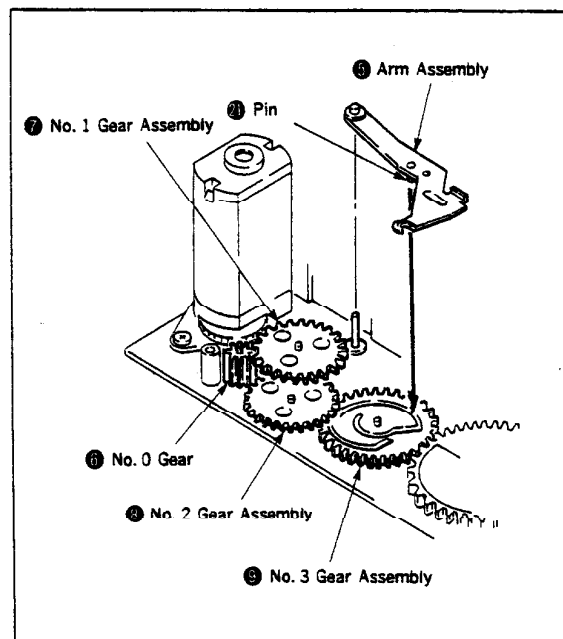


Fig. 34

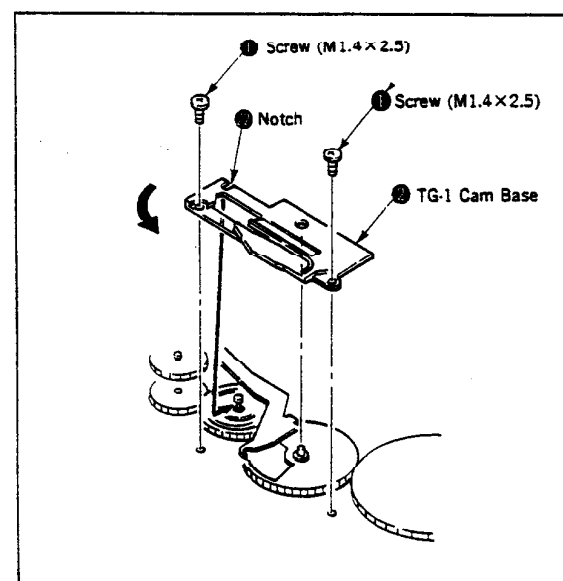


Fig. 35

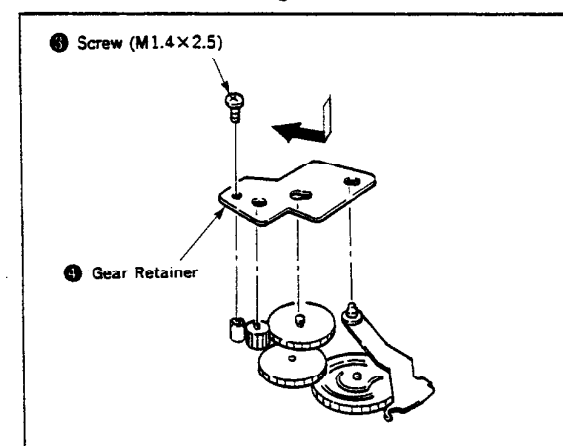


Fig. 36

6 GEAR TRAIN OPERATION CHECK (Fig. 37)

Removal

Referring to 1-1, remove the cassette compartment holder assembly.

Referring to 3-7, remove the LS chassis.

Referring to 3-17, remove the loading motor.

Check

Insert the tip of tweezers into the hole a of the cam A ①. Rotate the cam A ① by about two thirds of a turn in a direction of the arrow A, and then, in a direction of the arrow B by the same amount. Repeat this 3 times.

When this is done, check that each, gear, the GL slider assembly and LS arm assembly rotate smoothly, and that no load is applied to them.

- 4) At the same time, check that the LS roller ② is located almost at the end point of the groove of the cam A ① when the gear train comes into contact with the stoppers at both ends.

Note : When rotating the cam A ① with the tip of tweezers, etc., be careful not to scratch the mechanical chassis.

3. Mounting

- 1) Referring to 3-17, mount the loading motor.
- 2) Referring to 3-7, mount the LS chassis assembly.
- 3) Referring to 1-1, mount the cassette compartment holder assembly.

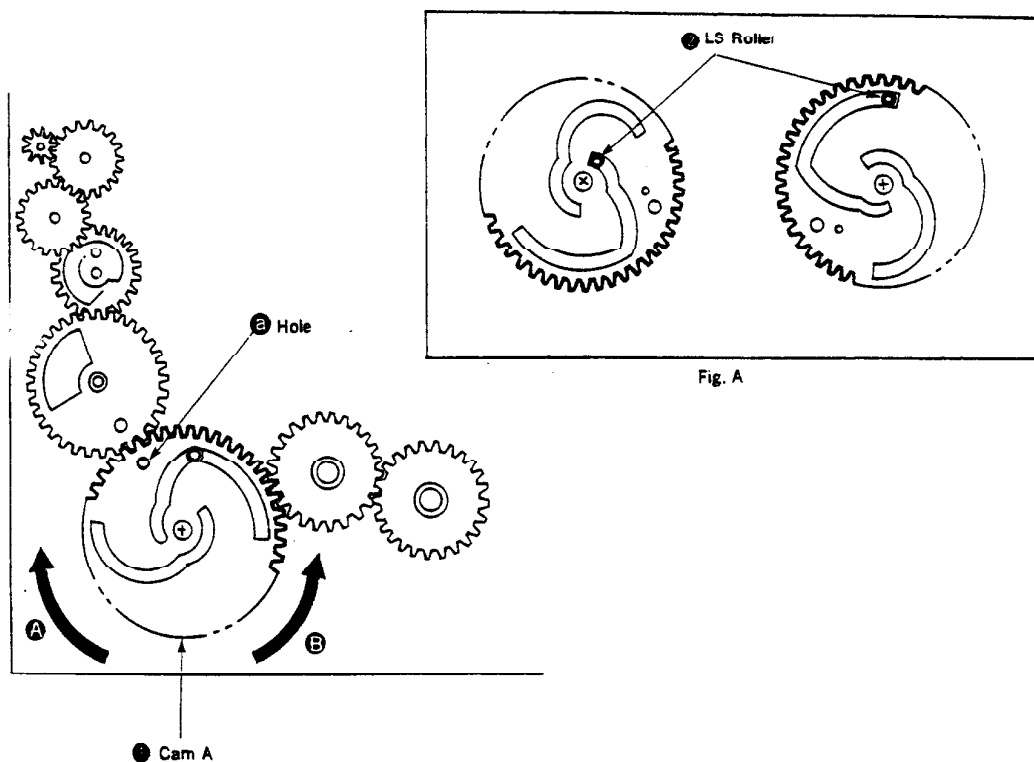


Fig. 37

3-17 LOADING MOTOR ASSEMBLY (Fig. 38)

1. Removal

- 1) Remove the LB-12 board.
- 2) Remove the connector ❶.
- 3) Remove the screws ❷ and ❸, and remove the loading motor assembly ❹ in an arrow direction.

2. Mounting

- 1) Put the pin ❺ of the loading motor assembly ❹ in the hole of the mechanical chassis, and mount it with the screws ❷ and ❸ in that order.
- 2) Mount the connector ❶.
- 3) Mount the LB-12 board.

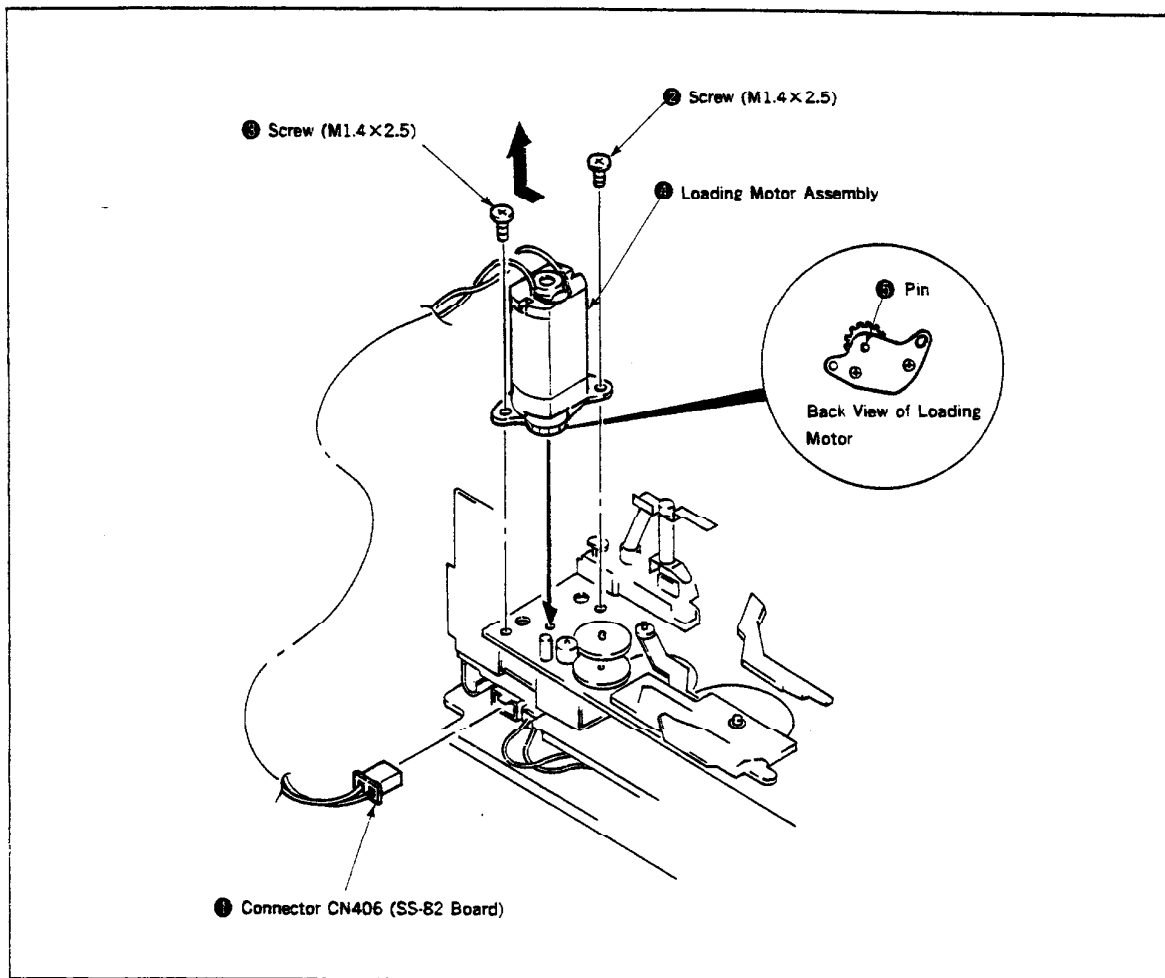


Fig. 38

3-18 GUIDE RAIL BASE 1 ASSEMBLY (Fig. 39)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Unskate the LS chassis a little.
- 3) Remove the two screws ①, and then, guide rail base 1 assembly ②.

Note : Be careful not to lose the spacers inserted in the parts ③ and ④ of the guide rail base 1 assembly ②. (Fig. B)

2. Mounting

- 1) Apply half a drip each of molyton grease at 2 places on the back of the guide rail base 1 assembly. (Fig. A)
- 2) Put the pin ⑤ of the guide rail base 1 assembly ② in the notch of the chassis, and tighten the two screws ① with a torque of 0.6kg·cm.
- 3) Referring to 1-1, mount the cassette compartment holder assembly.

Note1 : Mount paying attention to the number of spacers inserted and their locations.

Note2 : When tightening the screws, be careful not to bend the TG-2 upper flange ⑥ with a screwdriver bit.

Note3 : Note that the part c of the guide rail base 1 assembly is easily broken. (Fig. B)

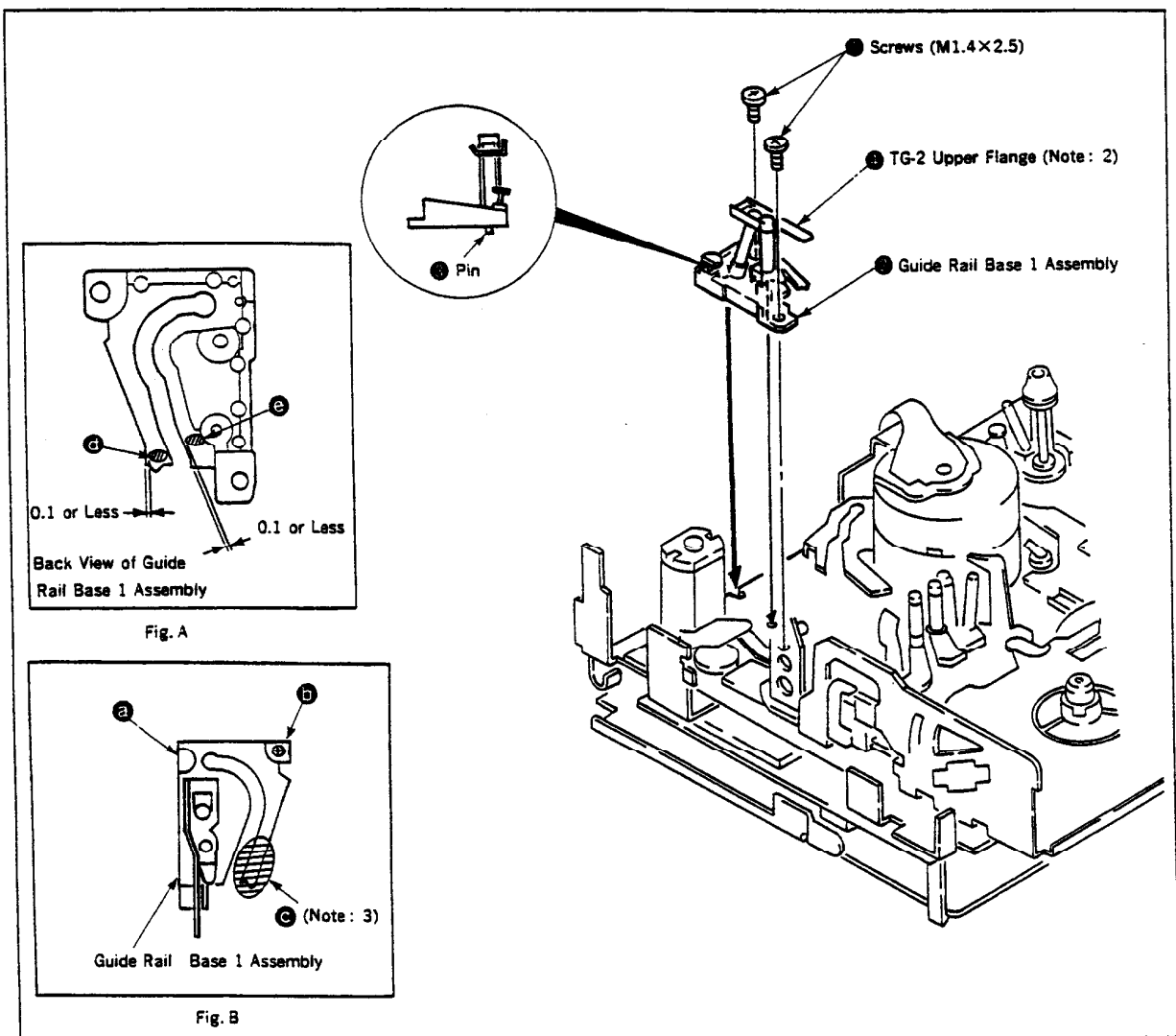


图39.

3-19 GUIDE RAIL BASE 2 ASSEMBLY (Fig. 40)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to the Service Manual, open the board in the back of the mechanical chassis.
- 3) Remove the four screws ●, and then, frame B assembly ● in a direction of the arrow A.
- 4) Unskate the LS chassis a little.
- 5) Remove the two screws ●, and then, guide rail base 2 assembly ● in a direction of the arrow B.

Note: Be careful not to hit the drum with a screwdriver bit because the screws are located closed to a drum lead.

2. Mounting

- 1) Apply half a drip of molyton grease each to 4 places on the back of the guide rail base 2 assembly. (Fig. A)
- 2) As shown in Fig. B, apply the striking parts of the guide rail base 2 assembly ● to the lower drum, and slide in an arrow direction to fit.
- 3) Pushing the part * of the guide rail base 2 assembly ● lightly in a direction of C (Fig. B), tighten the two screws ● with a torque of 0.8kg·cm.

Note: Note that the part f is easily broken.

- 4) Mount the frame B assembly with the four screws ●.
- 5) Mount the opened board to the back of mechanical chassis.
- 6) Referring to 1-1, mount the cassette compartment holder assembly.

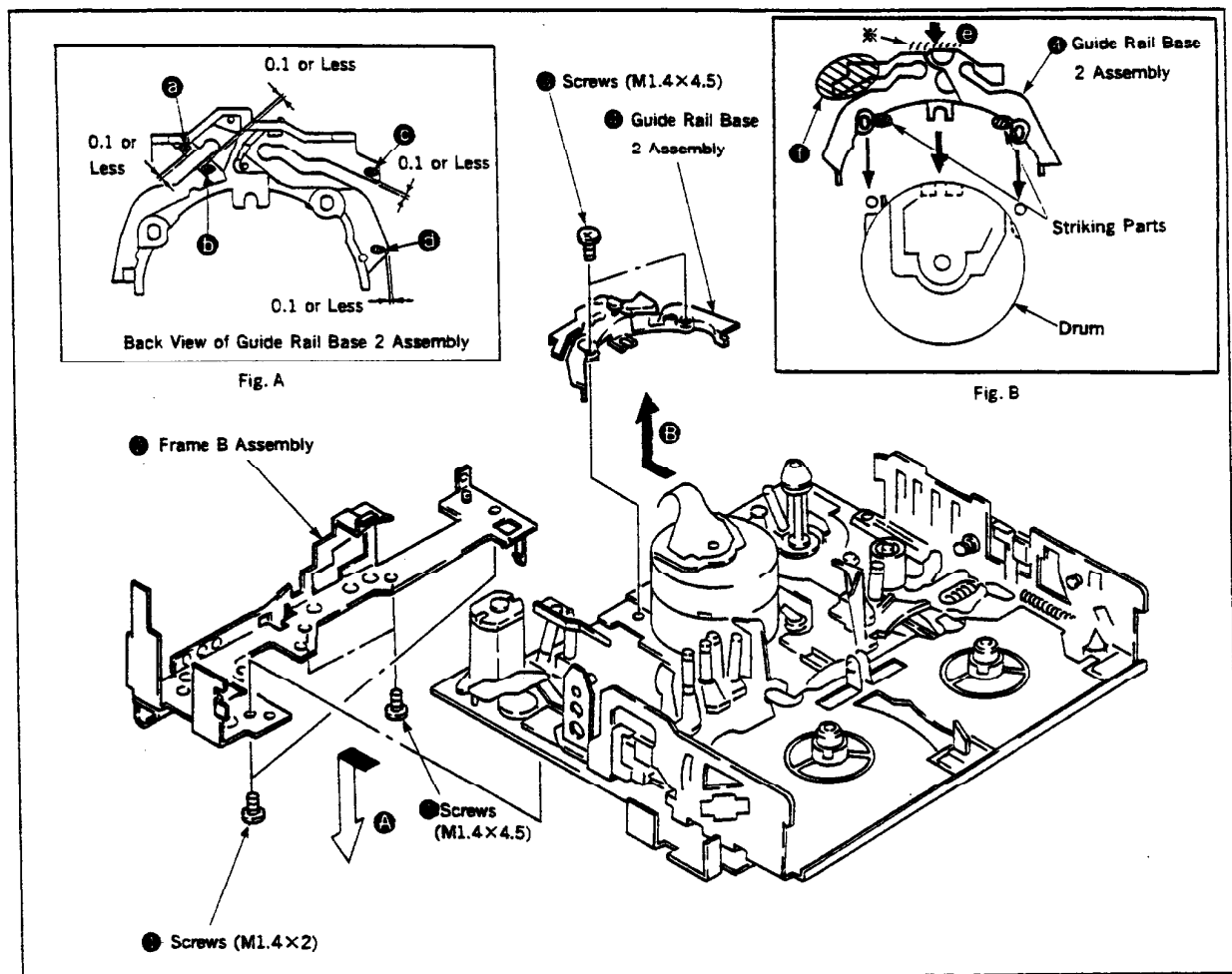


Fig. 40

3-20 GUIDE RAIL BASE 3 ASSEMBLY (Fig. 41)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Remove the flexible rotary shaft ①.
- 3) Remove the two screws ②. Remove the guide rail base 3 assembly ③ in an arrow direction, seeing to it that it does not hitch on the capstan housing.

Note : Handle the * marked part carefully because it is easily broken.

2. Mounting

- 1) Apply half a drip of molyton grease each to 2 places on the back of the guide rail base 3 assembly ③. (Fig. A)
- 2) Mount the guide rail base 3 assembly ③, seeing to it that it does not hitch on the capstan housing.
- 3) Tighten the two screws ② with a torque of 0.6kg·cm.
- 4) Mount the flexible rotary shaft ①.
- 5) Referring to 1-1, mount the cassette compartment holder assembly.

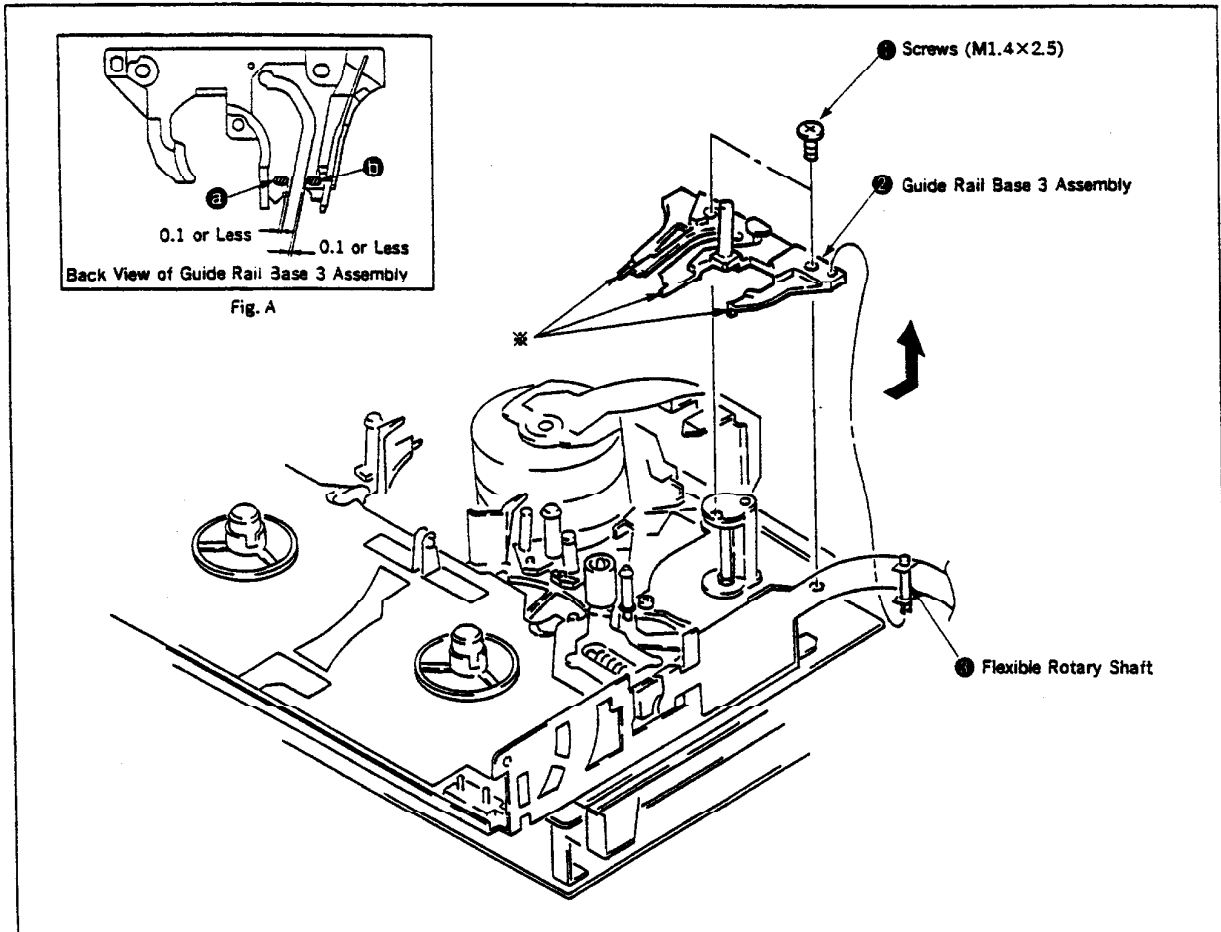


Fig. 41

3-21 CAPSTAN MOTOR ASSEMBLY (Fig. 42)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-20, remove the guide rail base 3 assembly.
- 3) Remove the connector 2 of the capstan motor assembly 1.
- 4) Remove the screw 3. Disengaging the gear of the conversion gear assembly 4, remove the capstan motor assembly 1 in an arrow direction (obliquely).

2. Mounting

- 1) As shown in Fig. A, incline the capstan motor assembly 1 to engage the gear of the capstan motor assembly 1 with that of the conversion gear assembly 4, and tighten the screw 3 with a torque of 1kg·cm.
When this is done, be careful not to damage the gear of the conversion gear assembly 4.
- 2) Mount the connector 2 to the capstan motor assembly 1.
- 3) Referring to 3-20, mount the guide rail base 3 assembly.
- 4) Referring to 1-1, mount the cassette compartment holder assembly.

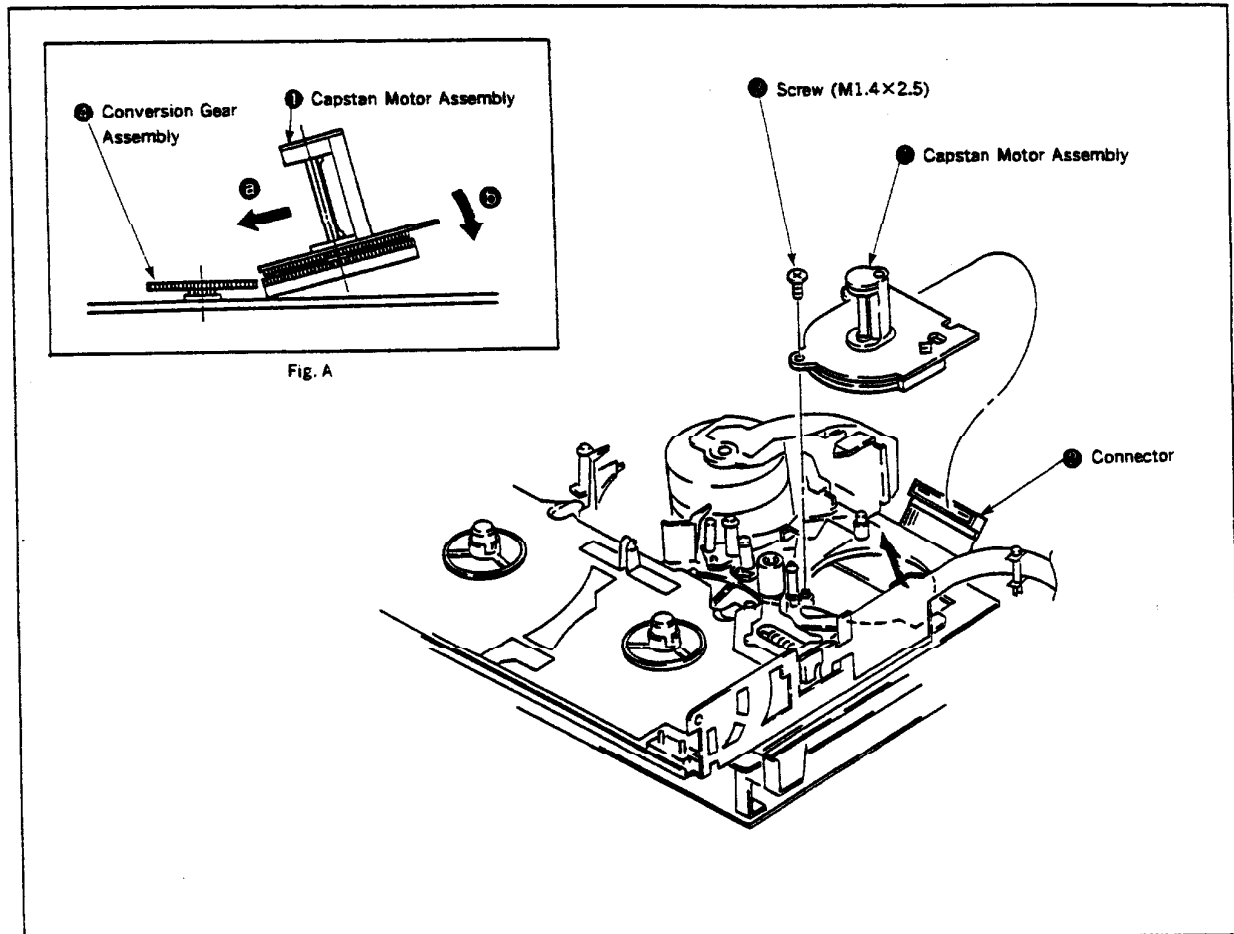


Fig. 42

3-22 DRUM BASE ASSEMBLY (Fig. 42)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Remove the motor flexible board ● from the board.
- 3) Referring to 3-19, remove the guide rail base 2 assembly.
- 4) Remove the two screws ●.
- 5) Draw out the head flexible board ● carefully from the hole of the mechanical chassis not to damage it, and remove the drum base assembly.

2. Mounting

- 1) Put the head flexible board ● in the hole of the mechanical chassis and put the positioning pins ● of the drum base in the holes of the mechanical chassis.
- 2) Tighten the two screws ● with a torque of $0.8\text{kg}\cdot\text{cm}$.
- 3) Referring to 3-19, mount the guide rail base 2 assembly.
- 4) Mount the motor flexible board ● to the board.
- 5) Referring to 1-1, mount the cassette compartment holder assembly.

Note : After mounting, make tape path adjustment in Section 4.

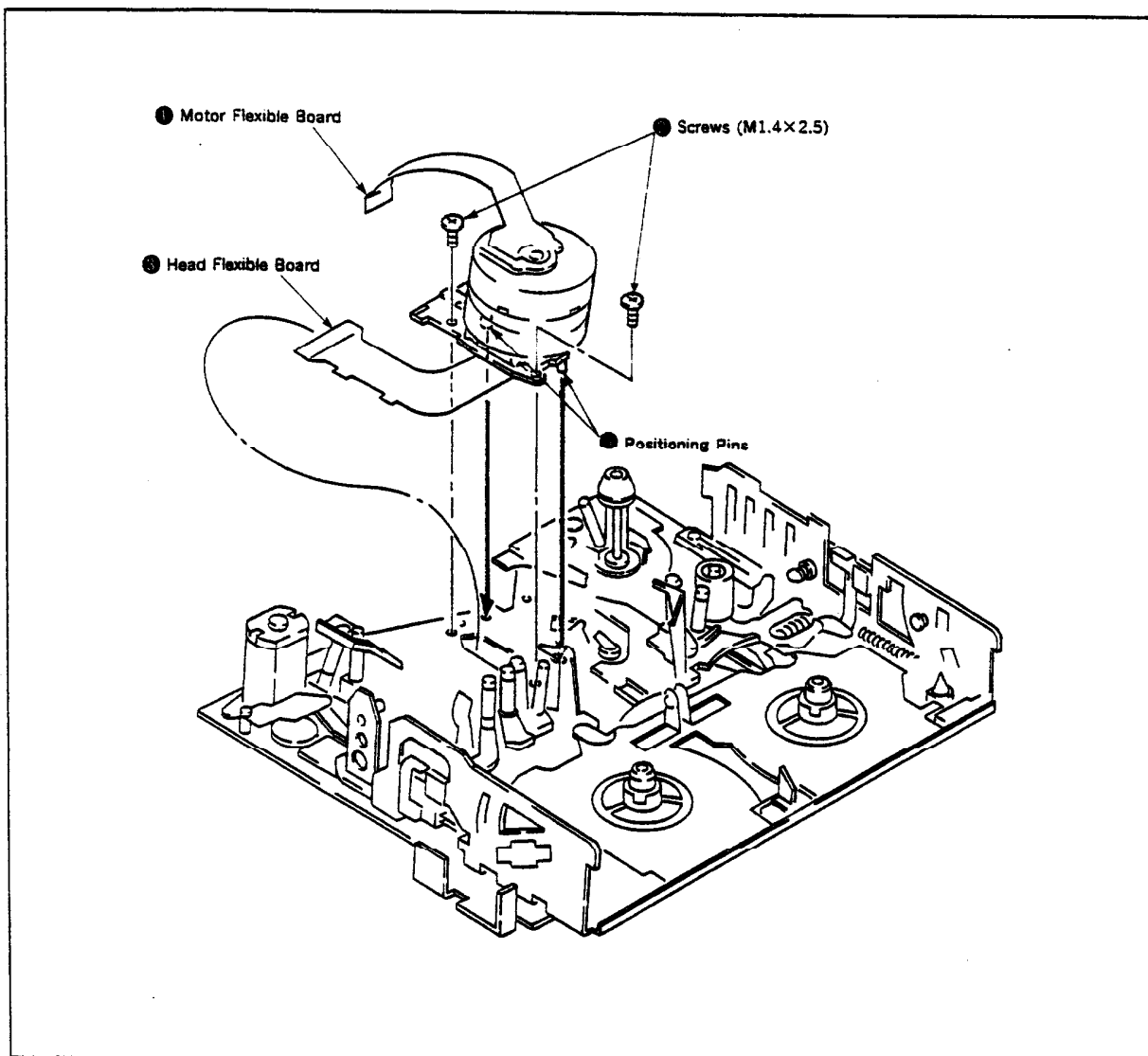


Fig. 42

3-23 DRUM ASSEMBLY (Fig. 43)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Remove the motor flexible board ● from the board.
- 3) Referring to 3-19, remove the guide rail base 2 assembly.
- 4) Remove the three screws ● from the back of the mechanical chassis.
- 5) Draw out the head flexible board ● carefully from the hole of the mechanical chassis not to damage it, and remove the drum assembly ●.

2. Mounting

- 1) Put the head flexible board ● in the hole of the mechanical chassis, and mount it so that the pins ● and ● will be put in the holes ● and ● shown in Fig. A.
- 2) Tighten the three screws ● with a torque of 0.5kg·cm.
- 3) Referring to 3-19, mount the guide rail base 2 assembly.
- 4) Mount the motor flexible board ● to the board.
- 5) Referring to 1-1, mount the cassette compartment holder assembly.

Note : After mounting, make tape path adjustment in Section 4.

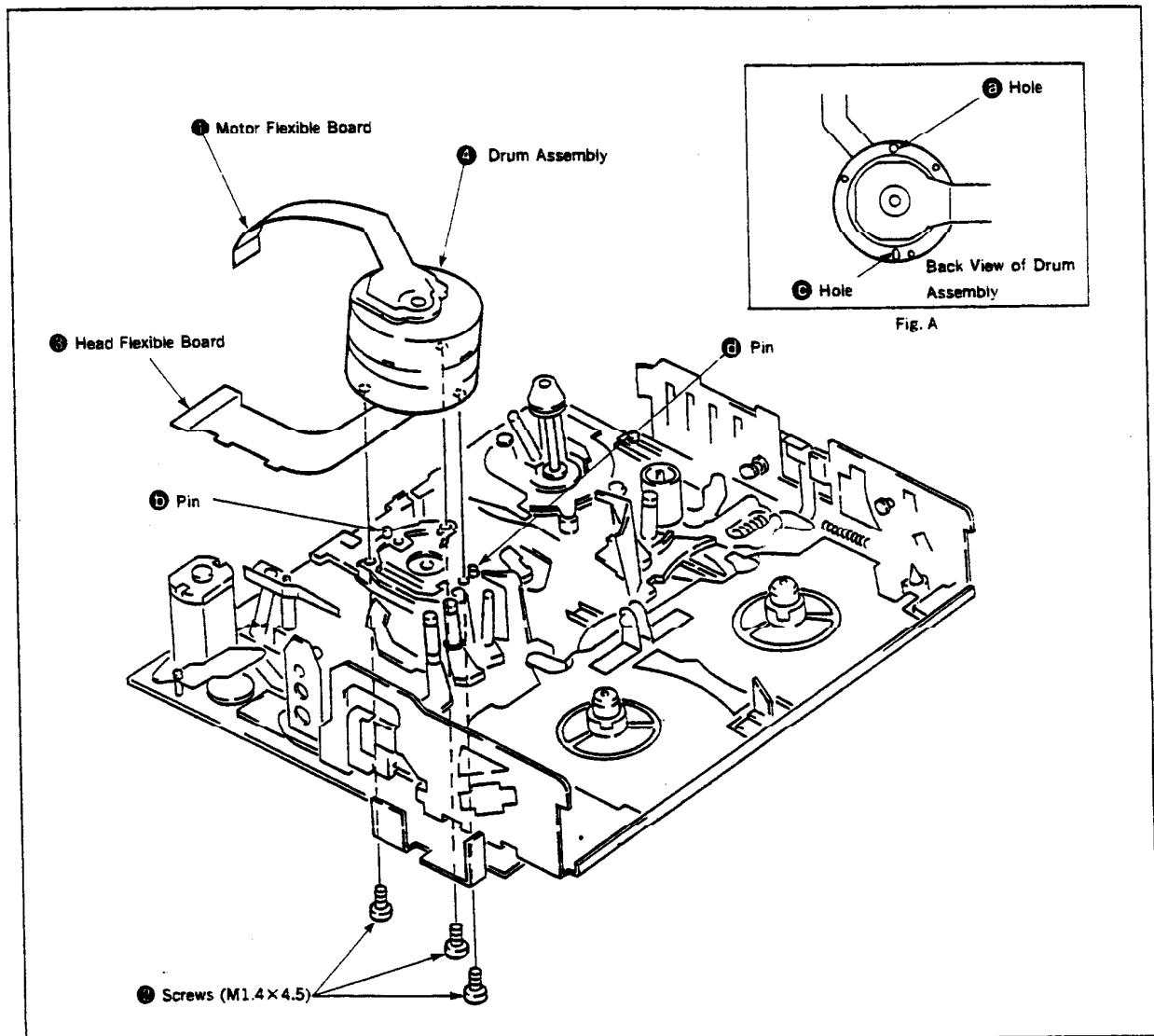


Fig. 43

3-24 Replacement of Rotary Upper Drum Assembly

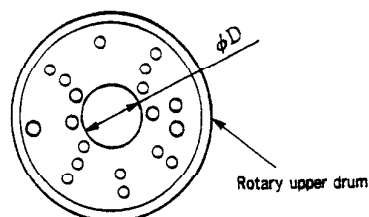
There are two rotary upper drum assembly types, depending on a color mark. (Fig. A in Fig. 45)

NTSC:

A-7049-190-A	Rotary upper drum assembly DGR-32-R-(1)
A-7049-189-A	Rotary upper drum assembly DGR-32-R-(2)

PAL:

A-7049-197-A	Rotary upper drum assembly DGR-37-R-(1)
A-7049-198-A	Rotary upper drum assembly DGR-37-R-(2)



Manufacturing upper drum

RANK	φD	MARK
A	$\phi 8^{+0.0015}_{+0.0001}$	Green
B	$\phi 8^{+0.001}_{+0.0005}$	Green, Brown
C	$\phi 8^{+0.0005}_{+0.0005}$	Black
D	$\phi 8^{+0.0005}_{+0.0005}$	Black, Brown
E	$\phi 8^{+0.0005}_{+0.001}$	Red
F	$\phi 8^{+0.0015}_{+0.0015}$	Red, Brown
G	$\phi 8^{+0.0015}_{+0.002}$	Blue
H	$\phi 8^{+0.002}_{+0.0025}$	Blue, Brown



Repairing upper drum

SUFFIX	φD	REMARKS	DRUM UPPER
-01	$\phi 8^{+0.001}_{+0.0005}$	Green, Brown	NTSC DGR-32-R-(1)
	$\phi 8^{+0.0005}_{+0.0005}$	Black	PAL DGR-37-R-(1)
-11	$\phi 8^{+0.001}_{+0.0015}$	Red, Brown	NTSC DGR-32-R-(2)
	$\phi 8^{+0.0015}_{+0.002}$	Blue	PAL DGR-37-R-(2)

1. Removal

- Referring to 3-23, remove the drum assembly.
- Remove the two screws ①. (Fig. 44)
- Hold the outlet (base) of the guide protector ②, lift it up obliquely. In that state, hold the outer figure of the back yoke ③ and remove it. (Fig. 44)

Note: Note that the flexible board and guide protector ② easily come off position because they are only pasted.

- As shown in Fig. A, set the rotor earth spring ④ around spring hook. (Fig. 44)
- Using a drum screwdriver (Ref. No. J-11), remove the two hexagon socket bolts ⑤, and then, rotary upper drum assembly ⑥. (Fig. 45)
- Using the drum screwdriver (Ref. No. J-11), remove the two hexagon socket bolts ⑦, and then, rotor ⑧. (Fig. A in Fig. 45)

2. Mounting

- Clean the flange surface ① and the surface of the rotary upper drum assembly ② which comes into contact with it, and make sure that there is no dust or scratch. (Fig. 45)
- Adjust a direction of the upper drum so that the head contact mold pin ③ will be put in the reference hole of the rotary upper drum assembly ④, and push it in lightly. (Fig. 45)

Note: Check visually that the clearance between the upper and lower drums is about 0.05mm.

- Using the drum screwdriver (Ref. No. J-11), tighten the two hexagon socket bolts ⑤ (800g·cm) and rotate it with finger to make sure that there is no abnormality. (Fig. 45)
- Put the pin ⑥ of the rotor ⑧ in the hole of the rotary upper drum assembly. Using the drum screwdriver (Ref. No. J-11), tighten the hexagon socket bolts ⑦. (800g·cm) (Fig. A in Fig. 45)
- Remove the rotor earth spring ④ from the spring hook. Using tweezers, etc., hook it onto the groove of the stator boss ⑨. (Fig. B in Fig. 45)

Note: See to it that the rotor earth spring ④ is not located in the gap between the flange and stator.

- Hold the outer figure of the back yoke ③, put it on the inner step of the upper drum and insert the other side slowly. (Fig. B in Fig. 44)
- Tighten the two screws ①. (500g·cm) (Fig. 44)
- Rotate the upper drum with finger to check that it runs smoothly.
- Referring to 3-23, mount the drum assembly.

Note: After mounting, be sure to make tape path adjustment in Section 4.

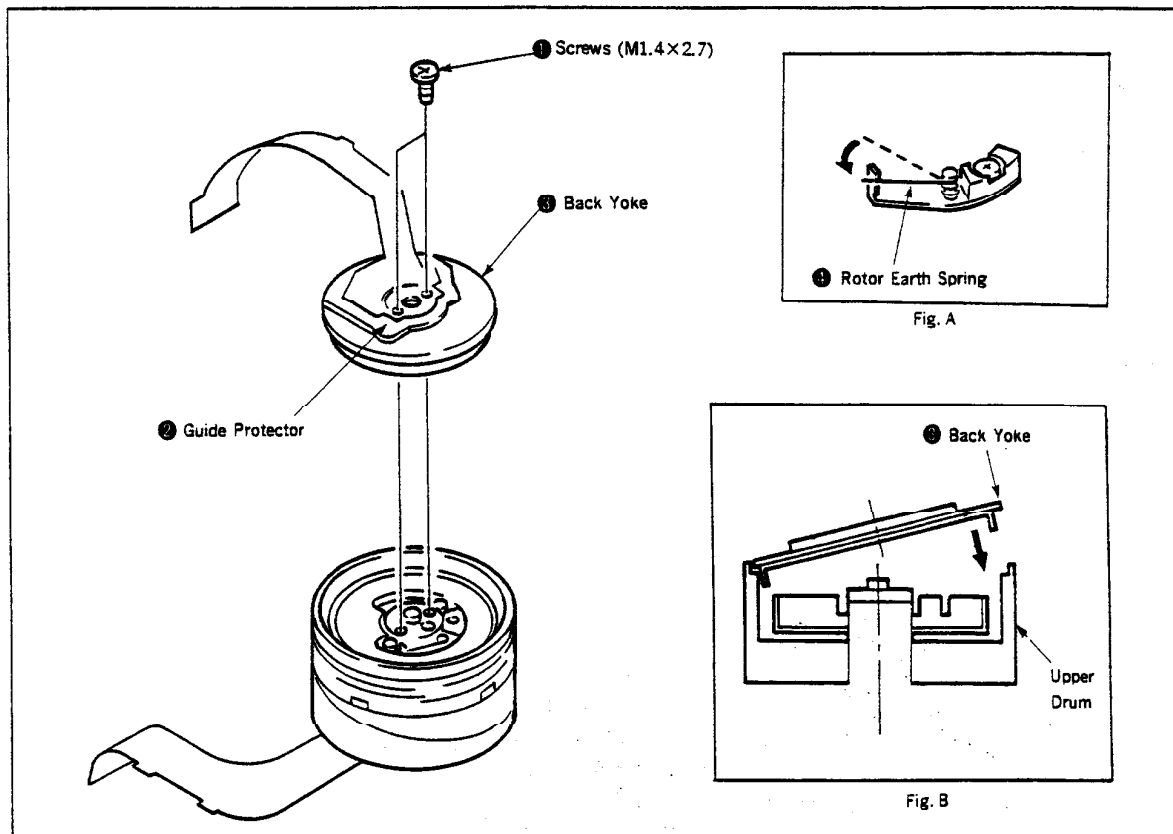


Fig. 44

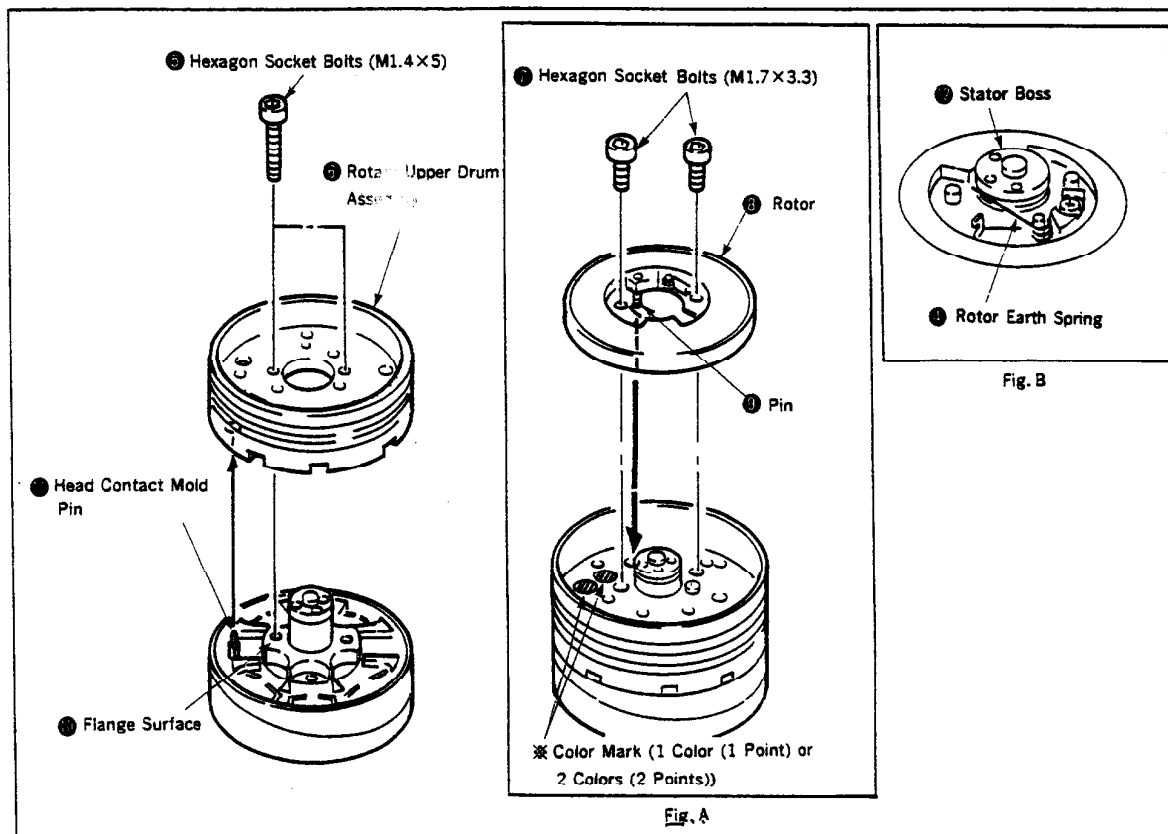


Fig. 45

5 REEL TABLE HEIGHT CHECK (Fig. 46)

Removal

Referring to 1-1, remove the cassette compartment holder assembly.

Referring to 3-1, remove the LED base.

Check

Using slide calipers, etc., check that distances from the LS chassis to the S reel table reel resting surface ② and T reel table reel resting surface ③ are ~~3.2±0.5mm~~ respectively.

3. Mounting

- 1) Referring to 3-1, mount the LED base.
- 2) Referring to 1-1, mount the cassette compartment holder assembly.

changed values

A: 3.2 ± 0.2
~~0.15mm~~

B: 3.2 ± 0.15 mm

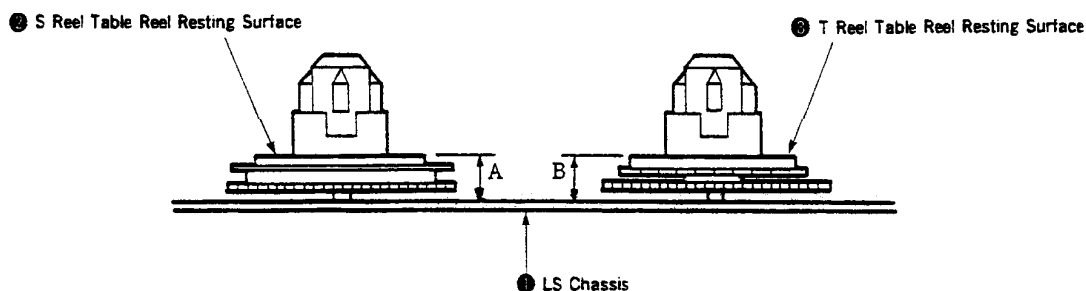


Fig. 46

6 FWD/RVS TORQUE CHECK

Set the FWD/RVS take-up torque cassette (Ref. No. J-10).

In the FWD mode, check that a T reel torque value is

~~4g·cm - 16g·cm~~ changed value 5 - 15g·cm.

Turn on the REC/REVIEW button and check that an S reel torque value is 25g·cm - 45g·cm.

When the values above are not met, replace the respective reel tables.

3-27 TENSION REGULATOR POSITION ADJUSTMENT

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder.

2. Adjustment

- 1) Set a cassette tape, select the **REC** mode and run the tape. (Refer to 1-3)
- 2) With the tape running, check that the distance between TG-1 and TG-2 is ~~9.50-10.0mm~~ (Fig. 47)
- 3) When they are not at specified positions, remove the cassette and go through the steps 4) on.
- 4) Referring to 3-1, remove the LED base.
- 5) Loosen the screw ①.

changed value
9.35 - 10.7mm.

- 6) When TG-1 is located inside (or outside) its specified position, shift the TG-1 adjustment block 2 slightly in a direction of the arrow ④ (or ⑤) and fix with the screw ②. (Fig. 48)
- 7) Referring to 3-1, mount the LED base.

Note : Use the cassette tape after feeding the tape as far as a middle point.

Note : When taking the steps 4) and 5), remove the cassette tape first.

Note : Check that TG1 is able to move in direction C during **REC**.

3. Mounting

- 1) Referring to 1-1, mount the cassette compartment holder assembly.

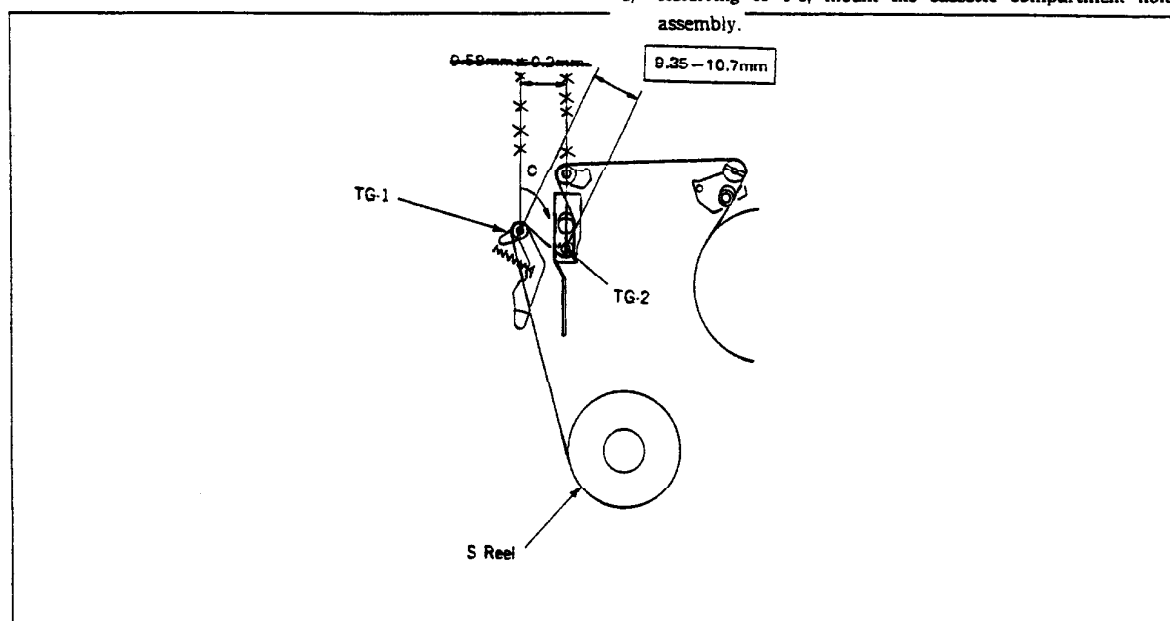


Fig. 47

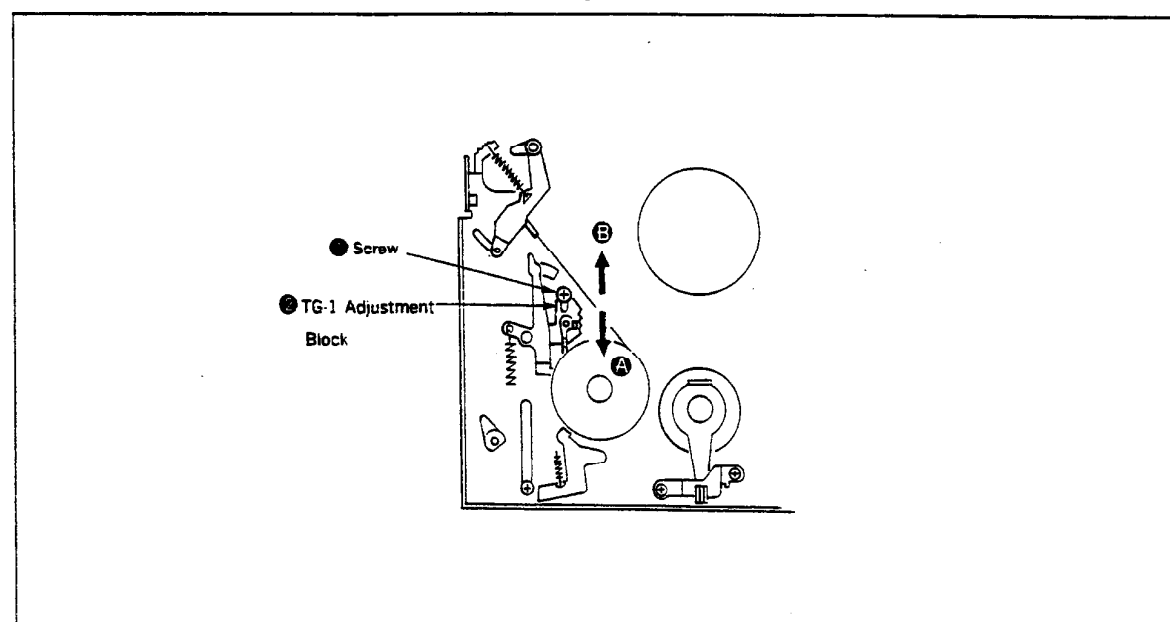


Fig. 48

3-28 FWD BACK TENSION ADJUSTMENT (Fig. 49)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment assembly.
- 2) Referring to 3-7, remove the LED base.

2. Adjustment

- 1) Select the **REC** mode.
- 2) Set the tension measurement reel (Ref. No. J-8) ②.
- 3) Using the dial tension gauge (Ref. No. J-7) ③, measure a tape tension at the outlet of TG-2. When this is done, pull the tape at a rate of 14mm/sec.
- 4) Change the position of the tension regulator spring ④ position as shown in Fig. A so that measure center value of the tension is 4 g-6.5g.

Note : When this is done, see to it that the gear ⑤ is not engaged with the S reel table.

3. Mounting

- 1) Referring to 1-1, mount the cassette compartment holder assembly.
- 2) Referring to 3-1, mount the LED base.

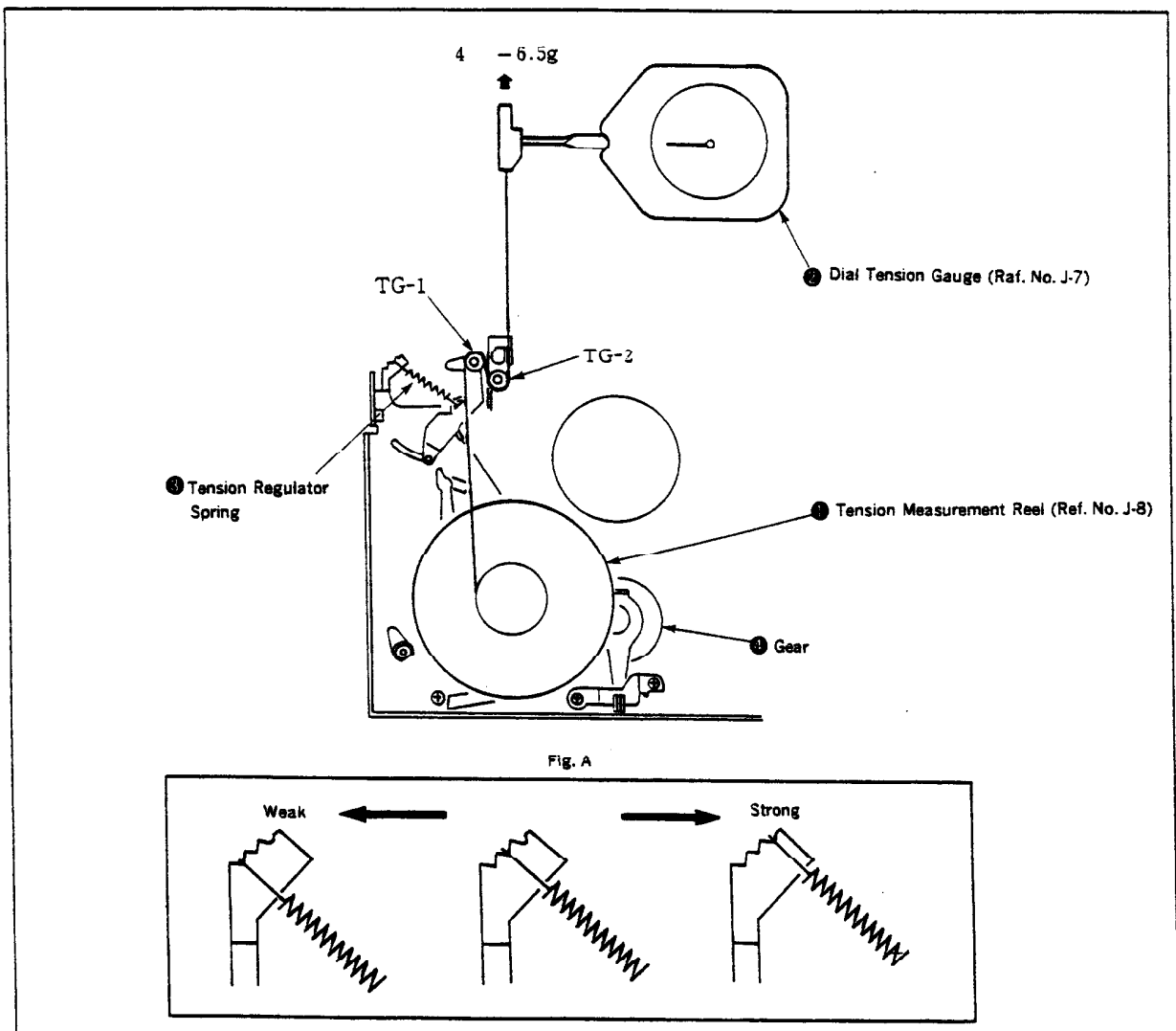


Fig. 49

4. TAPE PATH ADJUSTMENT

The 8mm video system uses ATF (Automatic Track Finding) which instantaneously controls a tape running speed based on 4 types of pilot signals and performs high-precision tracking.

This does away a tracking control knob and allows accurate track tracing.

On the other hand, however, the ATF system has a problem in adjusting the tape path system. That is, if head tracing is out of order a little, the ATF system automatically corrects it, which means that perfect adjustment cannot be done.

To avoid this problem, a track shift jig had been used to adjust the tape path system. In the FL (Q) mechanism, the ATF system is forcibly operated to shift a tracking amount constantly (approx. 1/4) by setting the PATH mode. So, fine tracking adjustment can be easily done.

No track shift jig is required any more.

Example) For CCD-V11/V88
CN404

4	GND
3	CAM ADJ
2	TEST
1	PATH

The path mode is set by shorting the pins ① and ④.

4-1 PREPARATION FOR ADJUSTMENT

- 1) Clean the tape running surfaces (tape guides, drum, capstan shaft, pinch roller). (Fig. 51)
- 2) Set the PATH mode by shorting the TEST pins (CN404 pins ① and ④ for CCD-V11/V88).
- 3) Connect to an oscilloscope.
- 4) Play back a tracking alignment tape (NTSC: WR5-1N), (PAL: WR5-1C).
- 5) Check that a RF waveform is flat at the inlet and outlet of the oscilloscope. (Fig. 50 ③)

When it is not flat, make adjustment in accordance with the procedures below.

When the RF waveform is not flat at the inlet/outlet ; (Fig.50 ⑤ and ⑥)

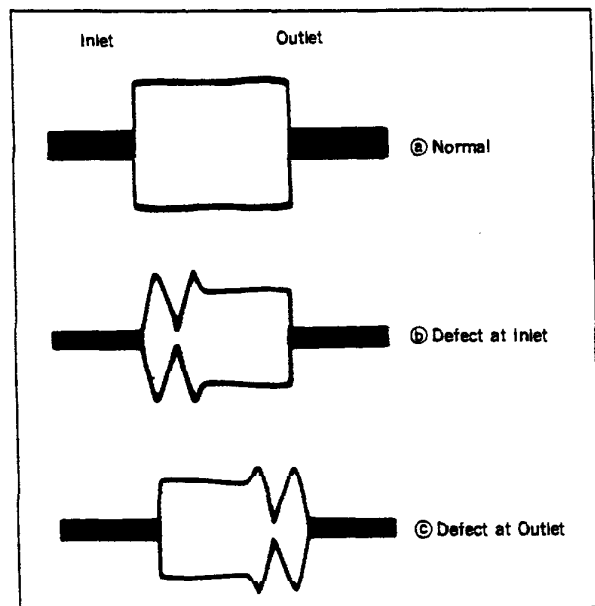


Fig. 50

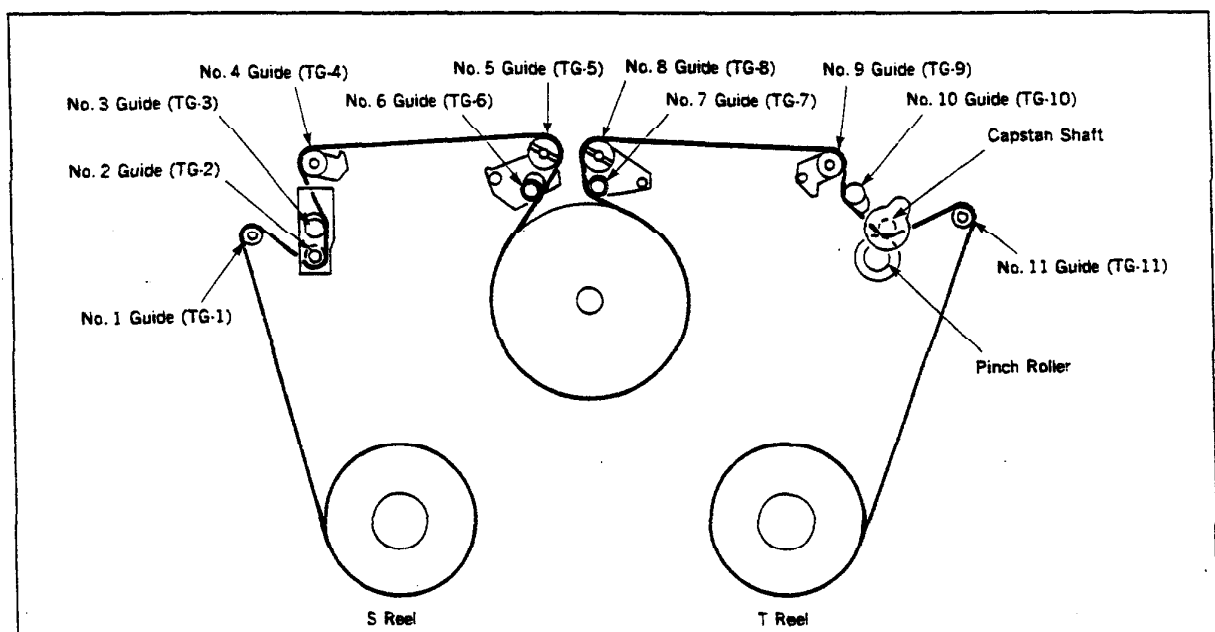


Fig. 51 Tape Guides Location

4-2 TRACKING ADJUSTMENT (Fig. 52)

- 1) Play back the tracking alignment tape.
- 2) Loosen the No. 5 guide (TG-5) lock screw ● and turn the No. 5 guide to flatten the waveform at the inlet.
- 3) Tighten the No. 5 guide (TG-5) lock screw ● to lock the No. 5 guide.
- 4) Loosen the No. 8 guide (TG-8) lock screw ● and turn the No. 8 guide to flatten the waveform at the outlet.
- 5) Tighten the No. 8 guide (TG-8) lock screw ● to lock the No. 8 guide. When this is done, make sure that the waveform does not change at the outlet.

Note : Be careful not to loosen the lock screw too much because the guide is easily moved.

Tape path Adjustment for "Guide Rail Base 2 with TG8 Gate Adjustment"

You do not have to adjust the TG-8 gate adjustment screw.

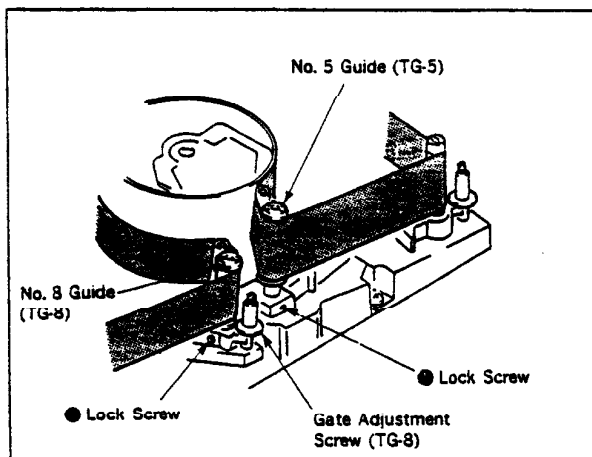


Fig. 52

4-3 NO. 4 GUIDE (TG-4) ADJUSTMENT

When an entire guide base is replaced, its height has been pre-set.

TG-4 Guide Height Presetting

- 1) With the top surface of the TG-4 guide leveled, rotate an upper flange by one turn. This is a preset height.

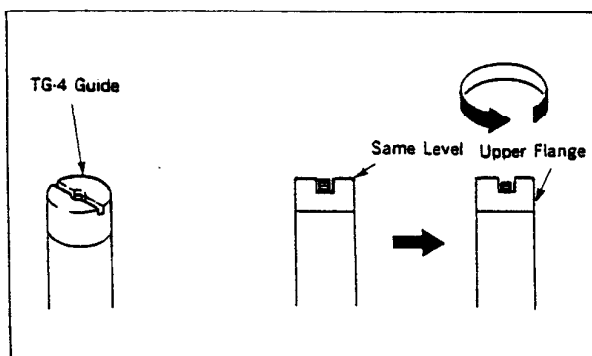


Fig. 53

No. 4 Guide (TG-4) Adjustment

- 1) Play back the tracking alignment tape.
- 2) In the FWD mode, check that the tape runs along a TG-4 lower flange. When there is a clearance, turn TG-4 counter-clockwise to put the tape along the TG-4 lower flange. turning angle must be within 180°.

When this is done, check that a tracking waveform (Fig. 54) is not changed.

When a tracking waveform inlet is downward as shown in Fig. 55, make tracking adjustment at the inlet side by raising a height of TG-4.

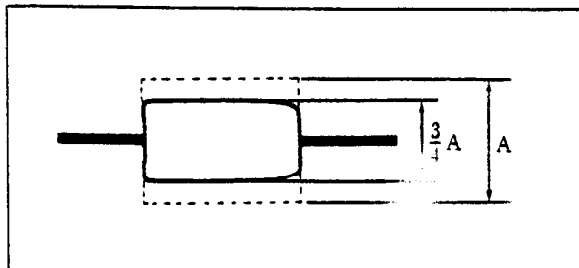


Fig. 54

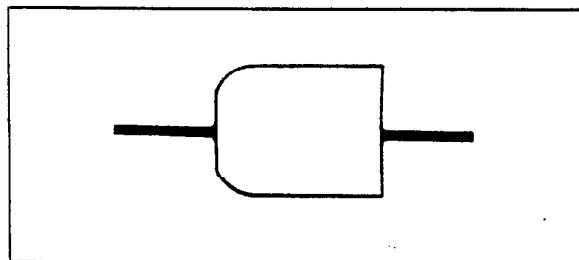


Fig. 55

Tape Path Adjustment for "Guide Rail Base 1 with TG4 Gate Adjustment" (Fig. 56)

After adjusting an inlet, when the TG-4 lower flange is curled in the REV mode, turn the TG-4 gate adjusting screw at pitches of 45° to the left to remove a curl. (A lock screw is attached to the TG-4 gate adjusting screw. First, loosen the lock screw a little, and then, turn the gate adjusting screw. After adjustment, tighten the lock screw.)

If the TG-4 gate adjusting screw is turned to the left too much, the TG-2 upper flange (arrow-indicated part in the figure above) is greatly curled. If it happens, turn the screw to the right.

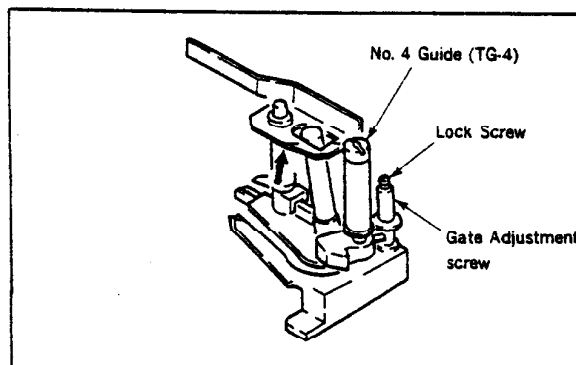


Fig. 56

4-4 NO. 11 GUIDE (TG-11) ADJUSTMENT

- 1) In the PLAY BACK mode, check that it has no deflection between the capstan and No. 11 guide (TG-11). (Criterion: 0.5mm or less)
when the tape is deflected, turn the No. 11 guide (TG-11) to remove its deflection. (Fig. 57)
- 2) Select the REV mode and check the RF waveform at the outlet side. (Fig. 58)
- 3) If the waveform is defective, turn the TG-11 nut counterclockwise by 90° and recheck 2), 3) and 4).
- 4) Apply screw lock to the No. 11 guide (TG-11).

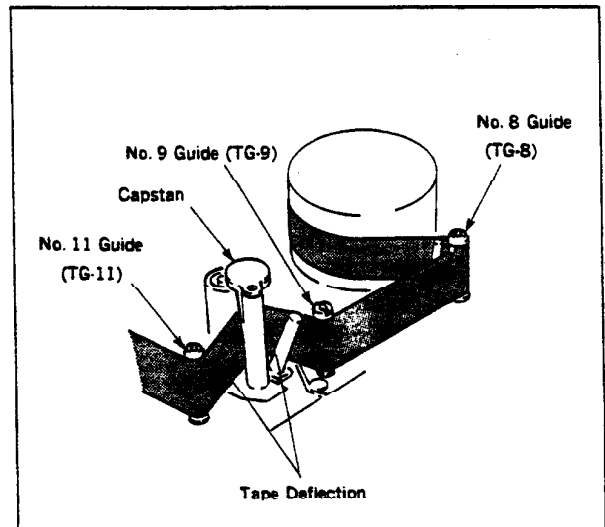


Fig. 57

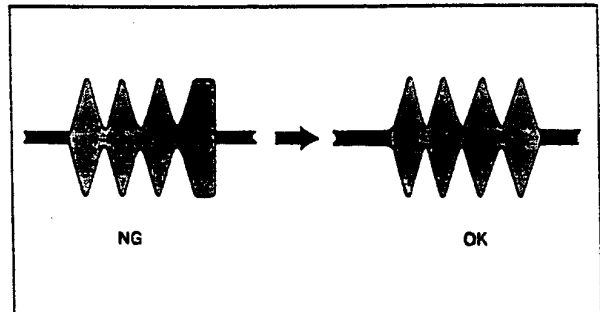


Fig. 58

4-5 CHECK AFTER ADJUSTMENT

1. Tracking Check

- 1) Play back the tracking alignment tape. In the PATH mode, shift a track. (Fig. 59)
- 2) At this time, check that a minimum amplitude value (E_{MIN}) is 67% or more of a maximum amplitude value (E_{MAX}). (Fig. 60)
- 3) Make sure that the waveform does not fluctuate greatly. (Fig. 61)

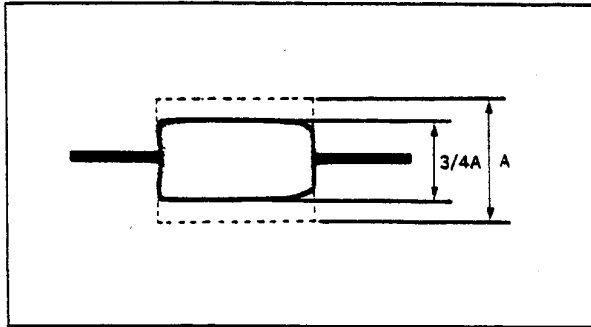


Fig. 59

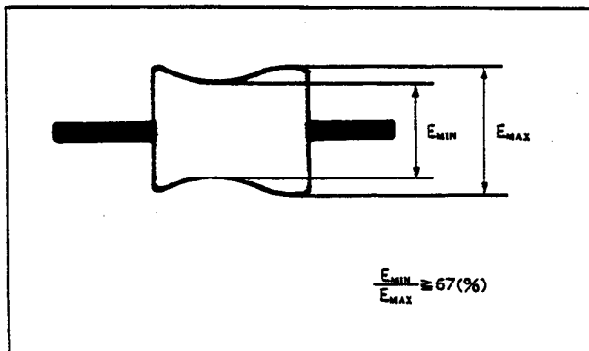


Fig. 60

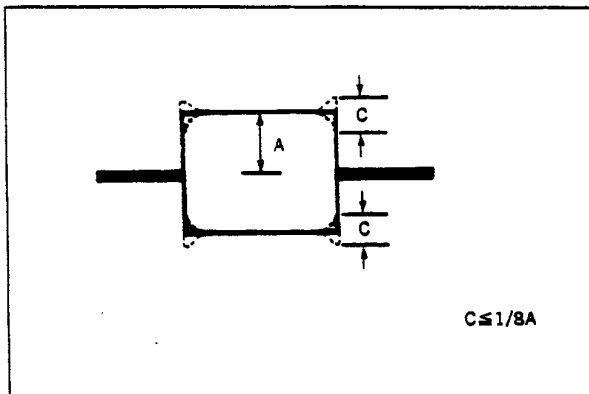


Fig. 61

2. CUE, REV Check

- 1) Play back the tracking alignment tape and select the **REV** mode. At this time, waveform peak pitches must be uniform. (Fig. 62 ㉓) When they not uniform, make tracking adjustment in 4-2 and No. 11 guide (TG-11) adjustment in 4-4.
- 2) Select the **CUE** mode. At this time waveform peak pitches must be uniform. (Fig. 62 ㉔) When not uniform, make tracking adjustment in 4-2.

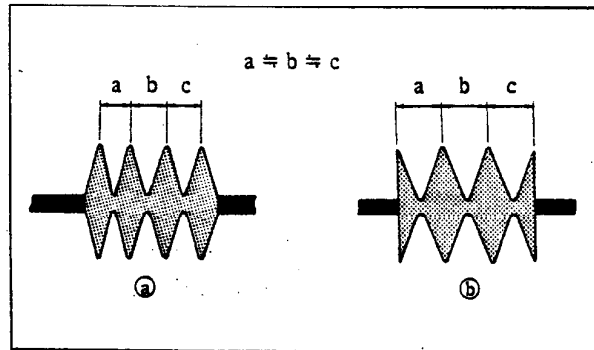


Fig. 62

3. Rise Check

- 1) Play back the tracking alignment tape.
- 2) In the PLAY BACK mode, check that the RF waveform rises horizontally within one second. At this time, check also that the tape is not deflected around the pinch roller. (Fig. 63)
- 3) Play back the tape after CUE/REV and FF/REW operation and check that the RF waveform rises horizontally within one second. At this time, check also that the tape is not deflected around the pinch roller.
- 4) Repeat the checks in 2) and 3).

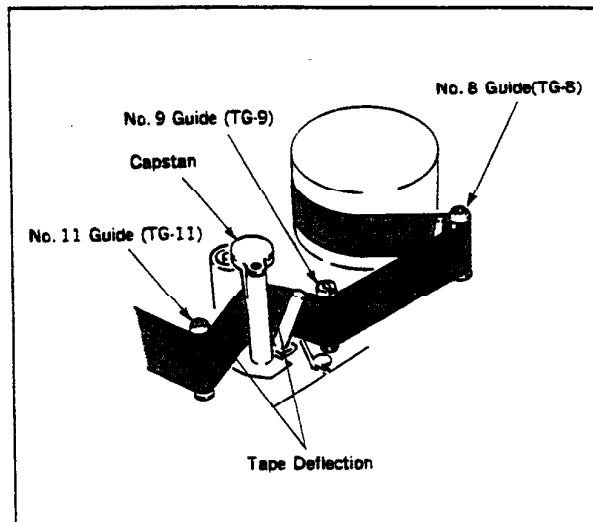


Fig. 63

4. Tape Running Check

In the **CUE** and **REV** modes, check that the TG-2 upper and lower flanges, TG-4 lower flange, TG-5 upper flange, TG-8 upper flange and TG-11 upper and lower flanges are not cued greatly. (Fig. 63)

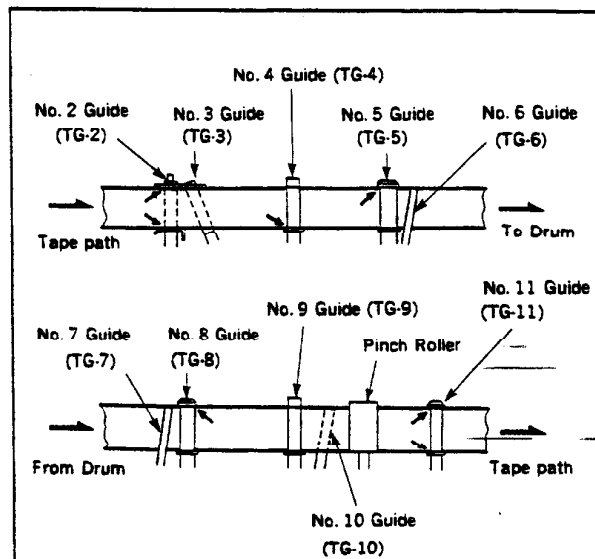
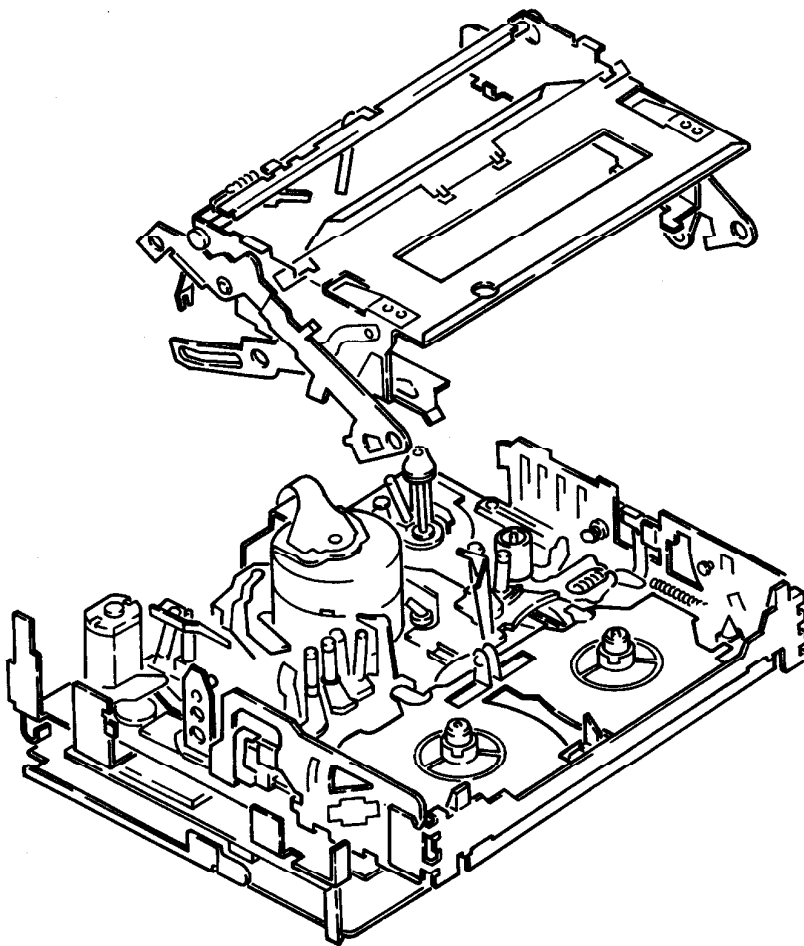


Fig. 64

8mm Video MECHANICAL ADJUSTMENT MANUAL II

FL MECHANISM (Q MECHANISM) Video 8

File with the SERVICE MANUAL



8 VIDEO RECORDER
SONY®

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1-2 CASSETTE COMPARTMENT LOCK HEIGHT ADJUSTMENT (Fig. 2)

- 1) Using a spacer, etc., insert a 15.3mm-thick cassette to lock the cassette compartment.

Note : As shown in Fig. A, a 15.3mm-thick portion may be under the throttle part ②.

- 2) Pressing the part ②, nip the F arm A ① and the first tooth of the C arm adjusting plate ③ with the clip ④, and tighten the adjusting screw ⑤ at a torque of 1kg·cm.

- 3) Apply Screw Lock to the adjusting screw ⑤ after making sure of the following clearances between the throttle part ② of the cassette compartment holder and the cassette as shown in Fig. B.

- For 15mm-thick dummy cassette : 0.5 – 0.9
- For 15.2mm-thick dummy cassette : 0.3 – 0.7

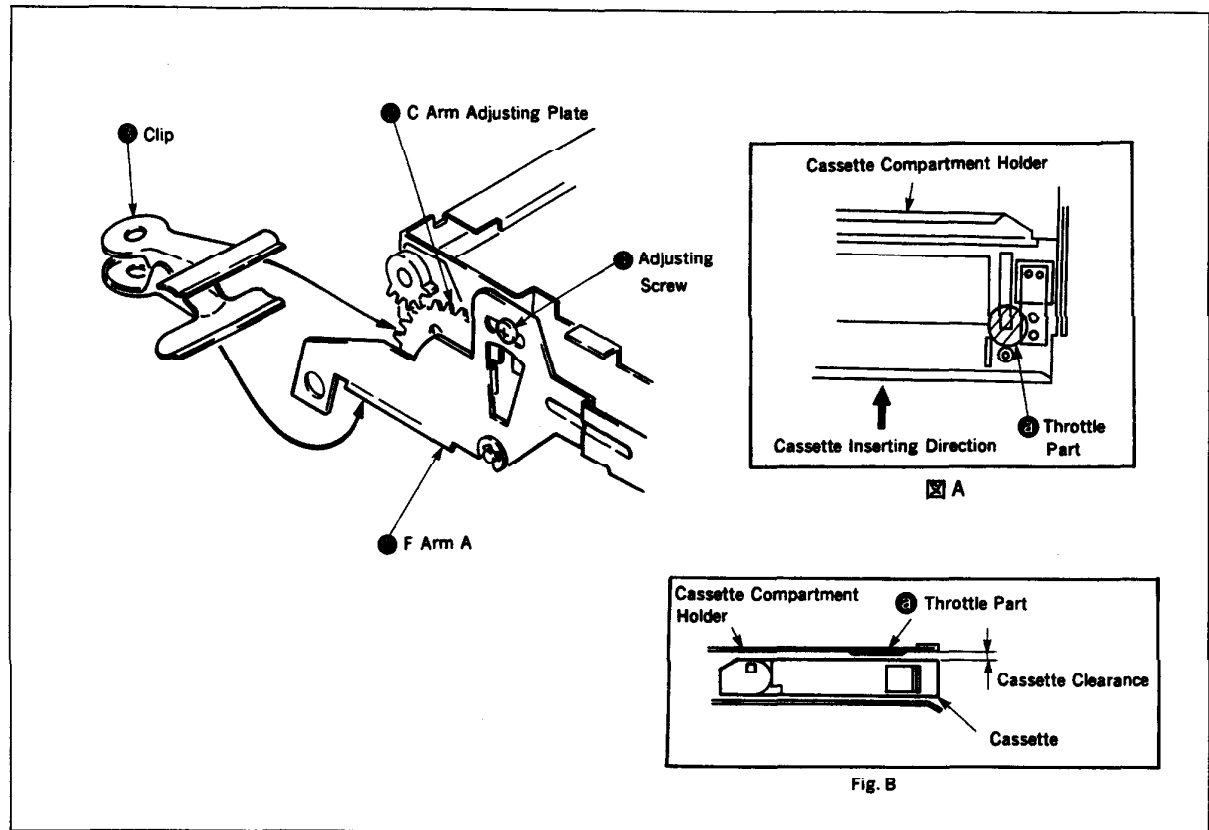


Fig. 2

1-3 OPERATION WITH CASSETTE COMPARTMENT HOLDER ASSEMBLY REMOVED

1. Putting into Loading state (Fig. 3)

- 1) Referring to the Service Manual, supply power with the cabinet and camera section removed. (Make the mechanism deck ready to operate.)
- 2) Place the cap ● on the LED assembly ●.
- 3) Press the pin of the push switch ● (ON state) and fix it with adhesive tape ● in that state.
- 4) Press the locking plate release arm ● in an arrow direction. The set is made ready for loading.

2. Putting into the REC Mode

- 1) Short the TEST pins (SS-82 board CN404 pins ● and ● for CCD-V11/V88) to place into the TEST mode.

For CCD-V11/V88 ; SS-82 board CN404

TEST pin connector

4	GND
3	CAM ADJ
2	TEST
1	PATH

The set is placed into the TEST mode by shorting the pins ● and ●.

- 2) After completing the step 1), set the power switch to VTR (or CAMERA).
- 3) Turn on the REC switch. (If the set is placed in the TEST mode, detection of S and T reel table rotation is disabled and the tape can run.)

3. Putting into EJECT

- 1) Turn on the EJECT switch.

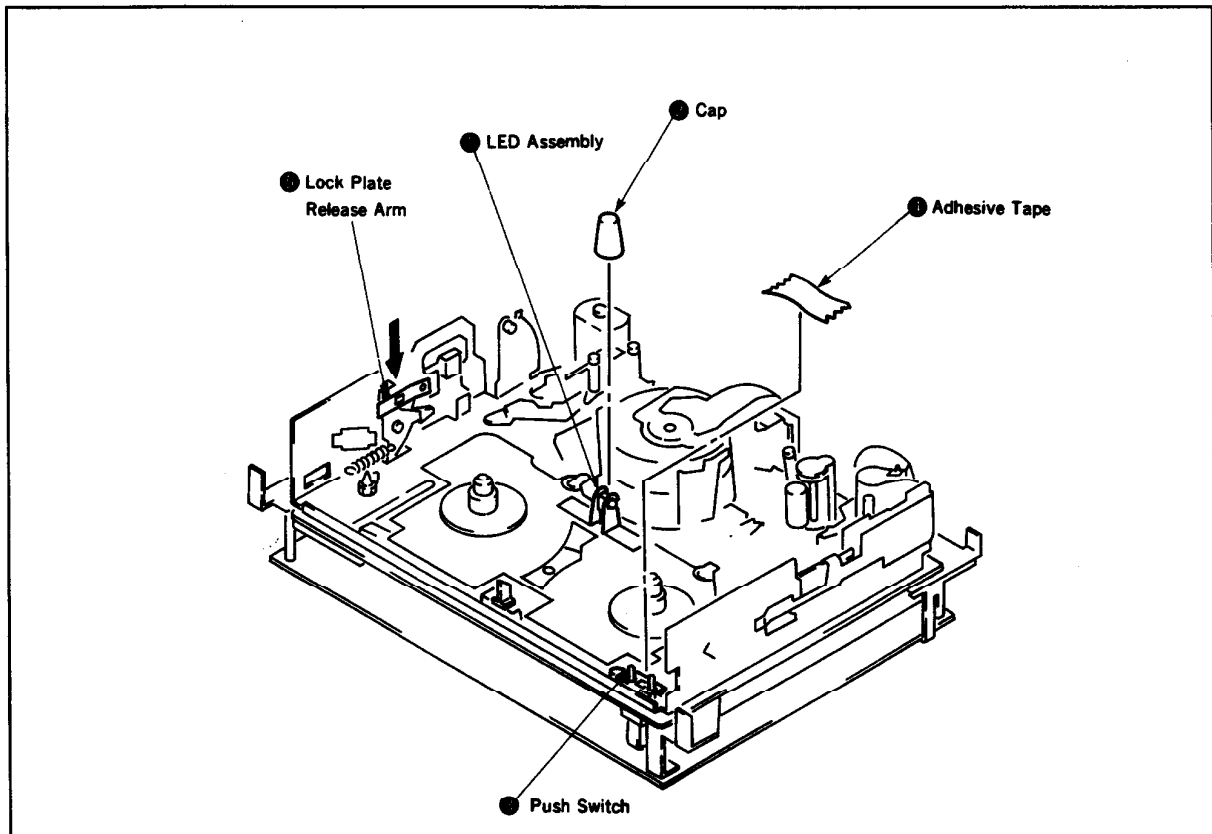


Fig. 3

1-4 HANDLING OF MODE SELECTOR

• Mount the MODE SELECTOR III panel to the mode selector.
U, FL, O and O' mechanisms have different mode indications respectively. Select your desired type. (Fig. 4)

1. Construction (Fig. 5)

2. Connection (Fig. 6)

For CCD-VII/V88

- 1) Remove the plate, ornamental ●.
- 2) Remove the screw ●, and then, the LB-12 board ●.
- 3) Remove the FP-114 flexible connector ● and loading motor connector ●, and insert them into the MODE SELECTOR III conversion connector respectively.
- 4) Insert the M-SW connector of the mode selector into the MODE SELECTOR III conversion connector.

3. Handling

- 1) Use the M mode selector buttons only.
- 2) During mode selection, "BLANK" lights up when no mode is being selected.
- 3) If the right M mode selector button is kept pressed, EJECT, USE, GL, Q.REW, GL, REC and READY light up in that order.
- 4) When changing over from the READY mode back to the EJECT mode, press the left M mode selector button to select your desired mode.

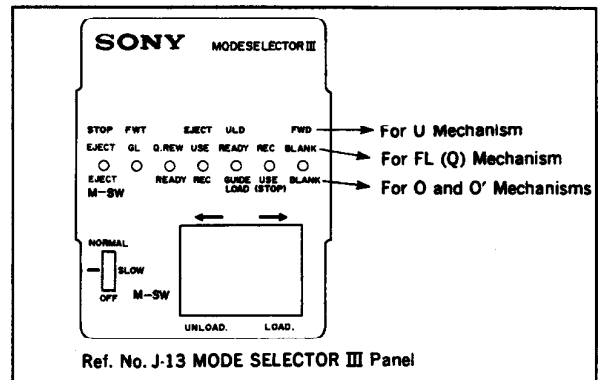


Fig. 4

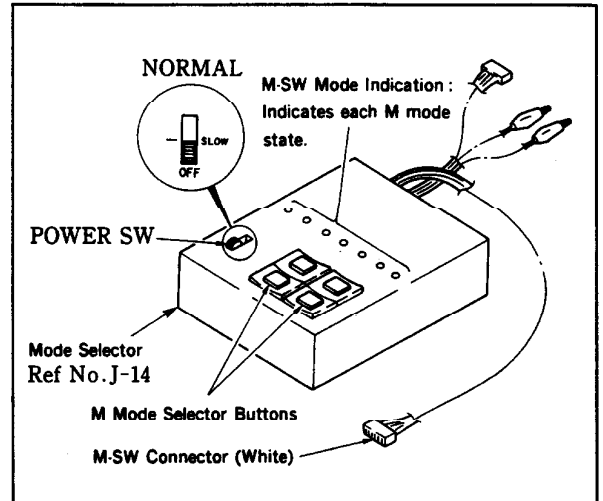


Fig. 5

For CCD-V11/V88

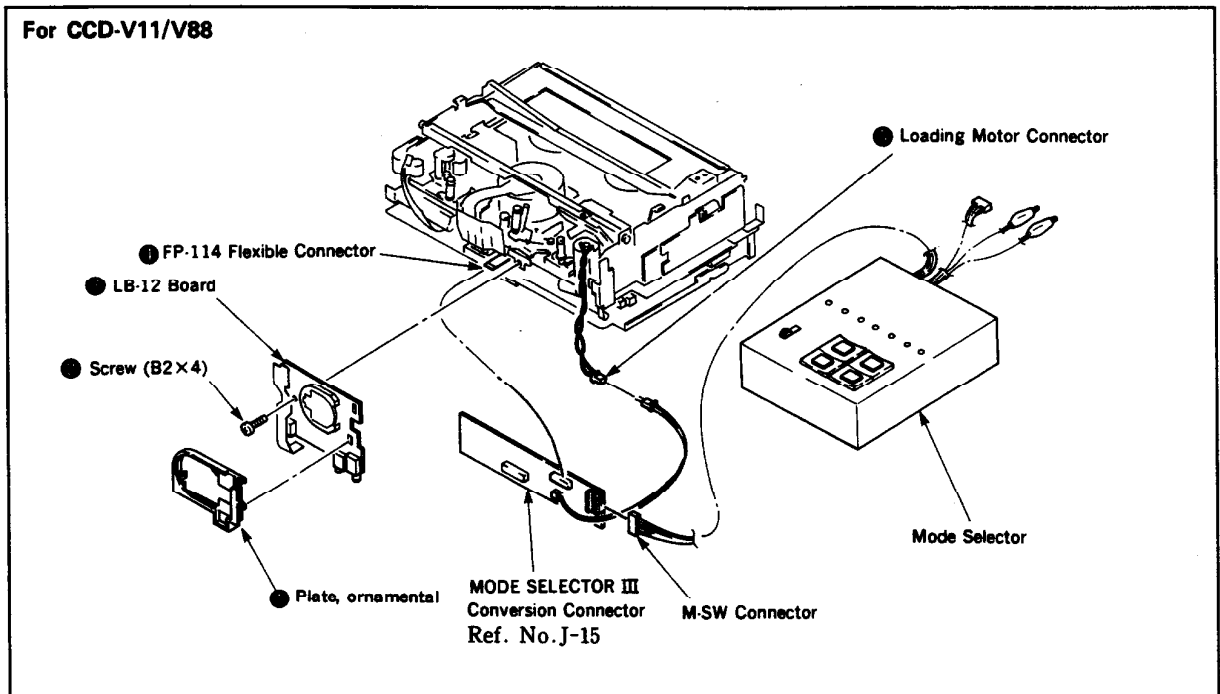
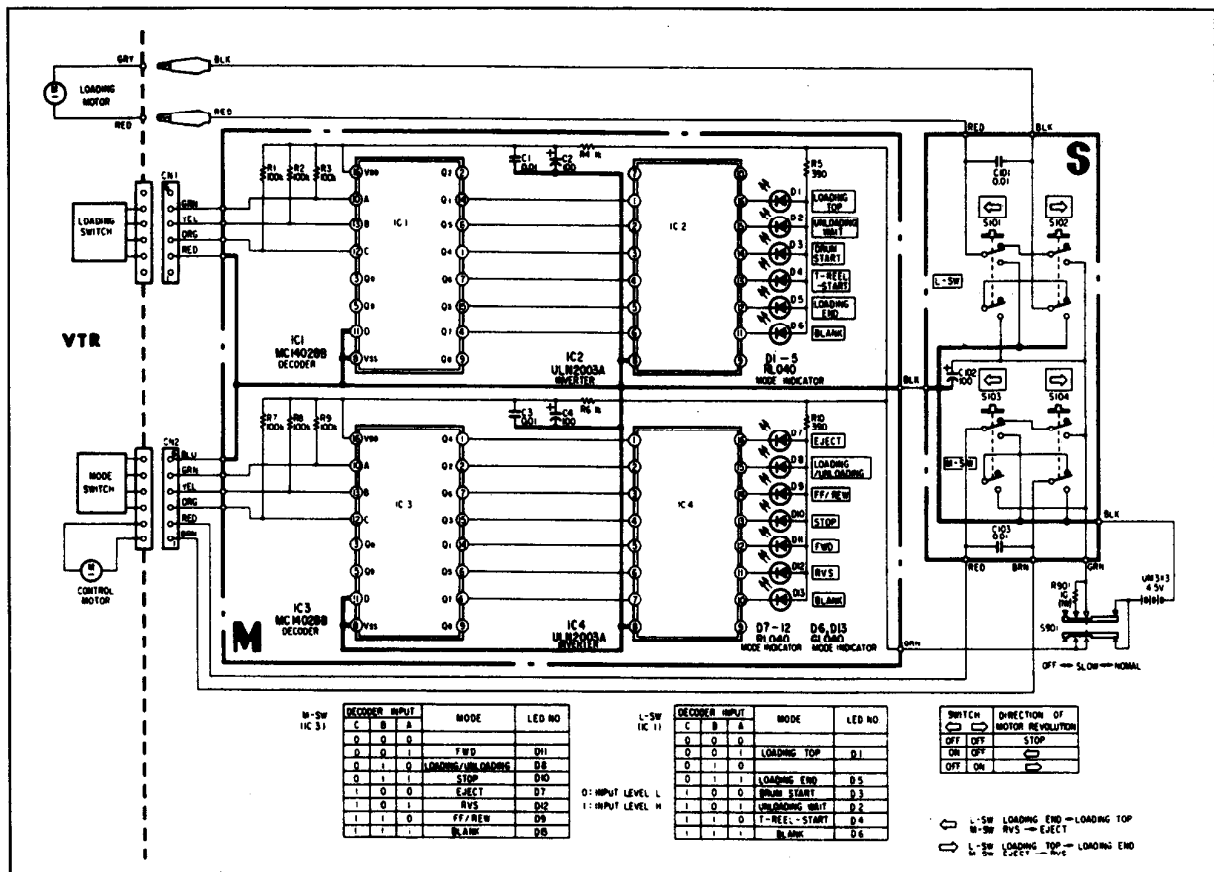


Fig. 6

1-5 MODE SELECTOR SCHEMATIC DIAGRAM



1-6 MODE SELECTOR PARTS LIST

Ref. No	Part No.	Description	Ref. No	Part No.	Description
CAPACITOR			IC		
C1	1-108-579-00	MILER 0.01μF 50V	IC1	8-752-240-28	IC TC4028BP
C2	1-123-333-00	ELECT 100μF 24V	IC2	8-752-120-03	IC μPA2003C
C3	1-108-579-00	MILER 0.01μF 50V	IC3	8-759-240-28	IC TC4028BP
C4	1-123-333-00	ELECT 100μF 24V	IC4	8-759-120-03	IC μPA2003C
C101	1-108-579-00	MILER 0.01μF 50V	RESISTOR		
C102	1-123-333-00	ELECT 100μF 24V	R1	1-247-179-00	CARBON 100K 1/4W
C103	1-108-579-00	MILER 0.01μF 50V	R2	1-247-179-00	CARBON 100K 1/4W
DIODE			R3	1-247-179-00	CARBON 100K 1/4W
D1	8-719-812-31	DIODE TLR123	R4	1-247-131-00	CARBON 1K 1/4W
D2	8-719-812-31	DIODE TLR123	R5	1-247-121-00	CARBON 390 1/4W
D3	8-719-812-31	DIODE TLR123	R6	1-247-131-00	CARBON 1K 1/4W
D4	8-719-812-31	DIODE TLR123	R7	1-247-179-00	CARBON 100K 1/4W
D5	8-719-812-31	DIODE TLR123	R8	1-247-179-00	CARBON 100K 1/4W
D6	8-719-812-33	DIODE TLG123A	R9	1-247-179-00	CARBON 100K 1/4W
D7	8-719-812-31	DIODE TLR123	R10	1-247-121-00	CARBON 390 1/4W
D8	8-719-812-31	DIODE TLR123	R901	1-214-594-00	METAL 10 1W
D9	8-719-812-31	DIODE TLR123			
D10	8-719-812-31	DIODE TLR123			
D11	8-719-812-31	DIODE TLR123			
D12	8-719-812-31	DIODE TLR123			
D13	8-719-812-33	DIODE TLG123A			

2. PERIODIC CHECK AND MAINTENANCE

- Carry out the following maintenance and periodic checks in order not only to fully exhibit the functions and performance of the set, but also for the equipment and tape. After repairing, service the set as follows, regardless of the length of use.

2-1 CLEANING OF ROTARY DRUM ASSEMBLY

- 1) Gently apply chamois cloth (Ref. No. J-2) soaked in cleaning liquid (Ref. No. J-1) to the rotary drum assembly. Clean it by rotating the upper rotary drum assembly slowly counterclockwise by hand.

Note : Do not rotate the motor by power or rotate the upper rotary drum assembly clockwise by hand. Also, the head tip is highly likely to be damaged if the chamois cloth is moved in a perpendicular direction to the it. Make sure to follow the instructions above for cleaning the rotary drum assembly.

2-2 CLEANING OF TAPE PATH (Fig. 7)

- 1) In the EJECT mode, clean the tape running system (TG-1, -2, -3, -4, -5, -6, -7, -8, -9, -10, -11, pinch roller, and capstan shaft) and the lower drum, using a superfine applicator (Ref. No. J-3) soaked in the cleaning liquid.

Note : Note that no oil or grease of each link mechanism adheres to the superfine applicator (Ref. No. J-3).

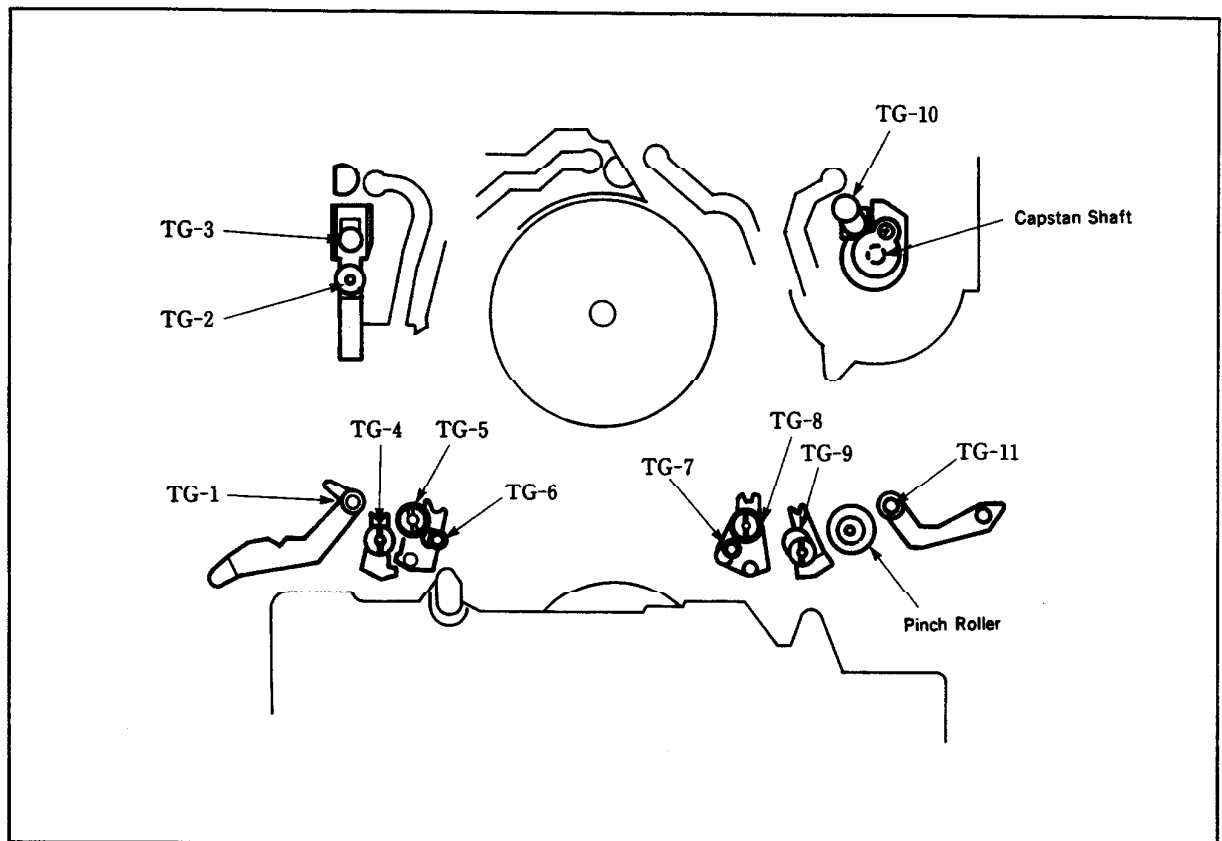


Fig. 7

2-3 PERIODIC CHECK ITEMS

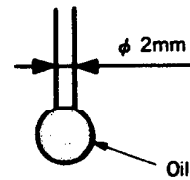
Location of Maintenance and check		Hours of Use (H)										Remarks
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
Tape transport System	Cleaning of tape path surface	○	○	○	○	○	○	○	○	○	○	Be careful of oil
	Cleaning and degaussing of rotary assembly	○	○	○	○	○	○	○	○	○	○	Be careful of oil
Driving System	Relay belt	—	☆	—	☆	—	☆	—	☆	—	☆	3-728-212-01
	Capstan shaft	—	◎	—	◎	—	◎	—	◎	—	◎	Be absolutely careful not to get oil on the tape path surface.
	Relay pulley sheft	—	◎	—	◎	—	◎	—	◎	—	◎	
	Loading motor	—	☆	—	☆	—	☆	—	☆	—	☆	1-541-607-11
Performance Confirmation	Abnormal noise	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	
	Back tension measurement	—	☆	—	☆	—	☆	—	☆	—	☆	
	Brake system	—	☆	—	☆	—	☆	—	☆	—	☆	
	FWD. RVS torque measurement	—	☆	—	☆	—	☆	—	☆	—	☆	

○ : Cleaning ◎ : Oil ☆ : Confirmation

Note : When overhauling, refer to the items above to replace parts.

Note : Concerning oil

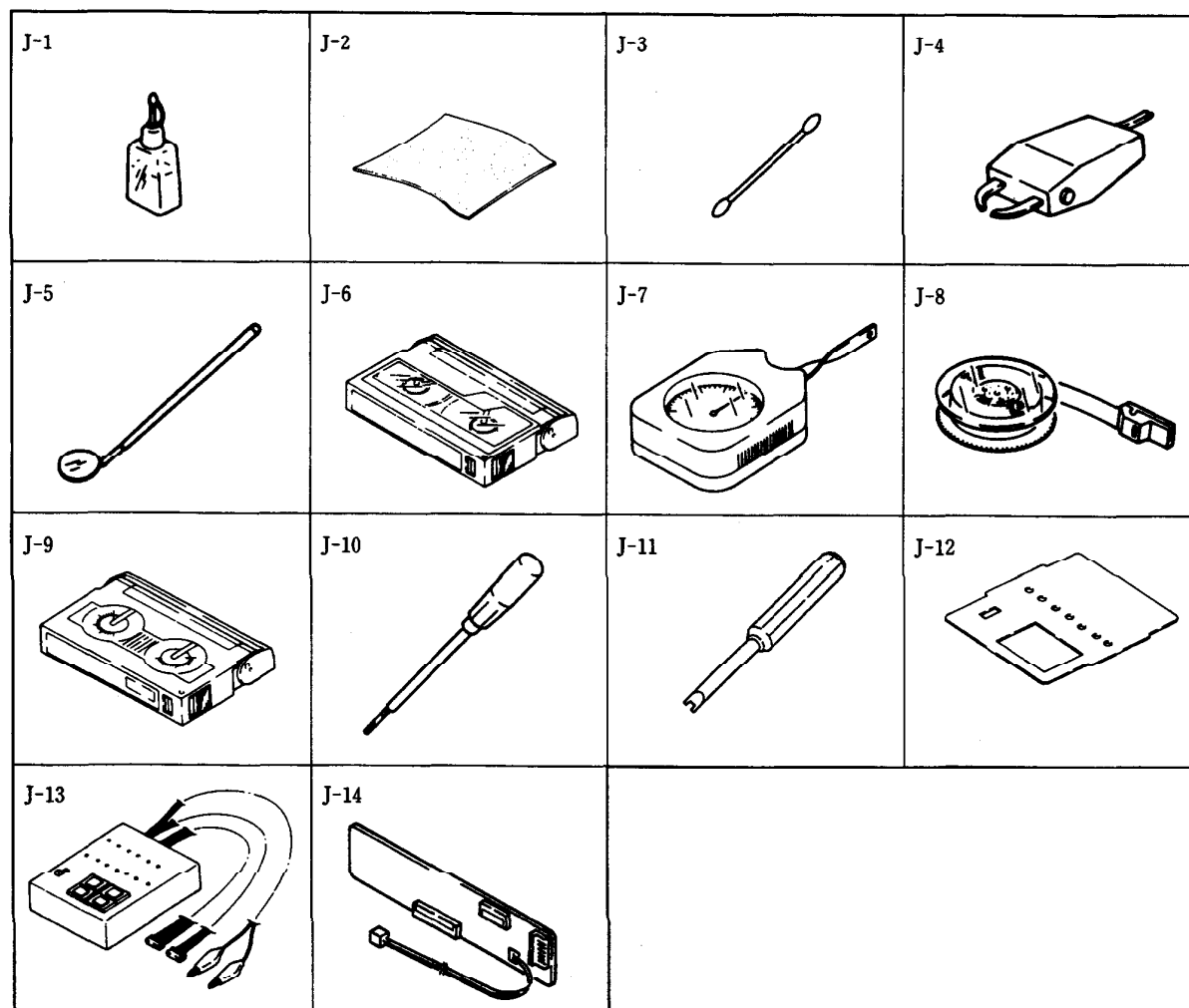
- Be sure to use specified oil. (If you use oil with different viscosity, etc., it may cause troubles.)
Oil : Part No. 7-661-018-18 (Mitsubishi Diamond Oil Hydrofluid NT-68)
- When lubricating bearings, be sure use oil free from dust, etc. (If you use oil with dust, etc. contained, it may cause bearings to be worn out or seized.)
- A drip of oil refers to an amount attached to the tip of a ϕ 2mm stick shown in the right figure.



2-4 Service jigs list

Ref. No.	Name	Part No.	Fixture No.	Usage and Others
J-1	Cleasing fluid	Y-2031-001-0	—	
J-2	Cleasing cloth	2-034-697-00	—	
J-3	Super fine applicator (Made by NIPPON APPLICATOR, P752D)		—	
J-4	Head degausser	Widely available	—	
J-5	Small mirror for adjustment Spare mirror	J-6080-029-A J-6080-030-1	SL-5052	Tape path
J-6	Alignment tape NTSC (WR5-1N) PAL (WR5-1C)	8-967-995-01 8-967-995-06		Tape path
J-7	Dial tension gauge	J-6080-827-A		Various torque measurement
J-8	Tension measurement reel	J-6080-831-A		With $\phi 30$ tape
J-9	FWD and RVS winding torque cassette	J-6080-824-A	GD-2086	
J-10	Drum screwdriver (Hexagonal wrench screwdriver)	7 700 766 01		
J-11	Screwdriver for tape path	J-6082-026-A		For tape guide adjustment
J-12	Mode selector III panel	J-6082-023-A		
J-13	Mode selector	J-6080-825-A		For all models
J-14	Mode selector III conversion connector	J-6082-021-A		

Other equipment ● Oscilloscope
● Analog tester (20k Ω)



3. MECHANICAL CHECK, ADJUSTMENT AND REPLACEMENT

Note : Use the mode selector (Ref. No. J-14) for the following mechanical checks, adjustments and replacements.

Note : The modes in are those set by pressing the mode selector buttons.

3-1 LED BASE (Fig. 8)

1. Removal

- 1) Select the USE mode.
- 2) Referring to 1-1, remove the cassette compartment holder assembly.
- 3) As shown in Fig. A, rotate the LED in a direction of the arrow **A** and remove it in a direction of the arrow **B**.
- 4) Remove the three screws **1**, **2** and **3**.
- 5) Lifting the LED base **4**, remove it by pushing it in a direction of the arrow **C**.

Note : Dismount and remount the LED base carefully, because its holder is easily deformed.

2. Mounting

- 1) Select the USE mode.
- 2) Put the claw **5** of the LED base **4** in the notch **6** of the LS chassis without catching the LED in between. Next, fit to the dowels **7** at 2 places.
- 3) Mount and tighten the screws **1**, **2** and **3** in that order.
- 4) As shown in Fig. B, set the LED in a direction of the arrow **A** and rotate it in a direction of the arrow **B** to fix.
- 5) As shown in Fig. C, bend a flexible board and put it in the holder.

Note : In the step2), make sure that the barring **8** of the arm assy, gear can appears in the hole of the LED base. (Fig. D)

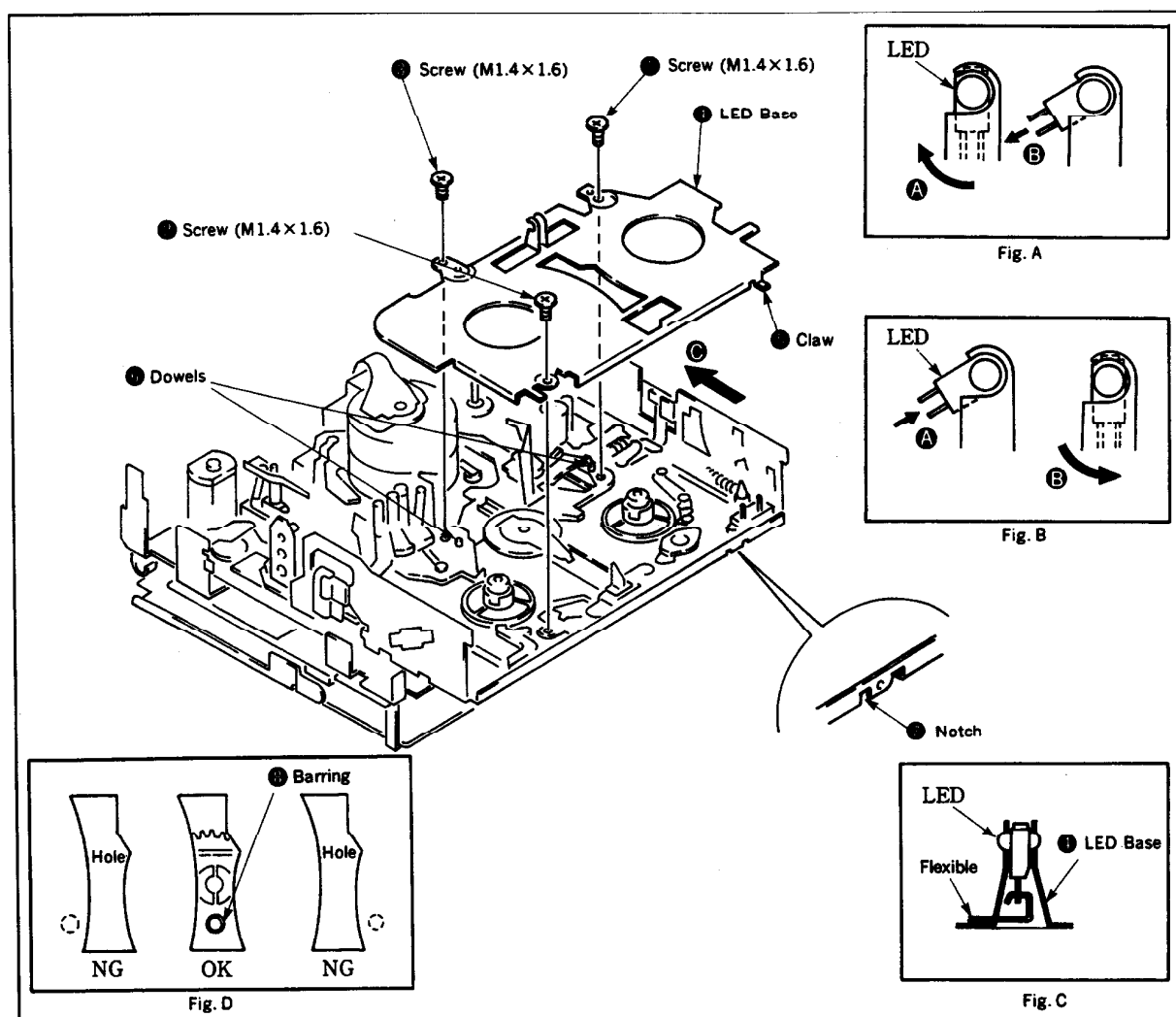


Fig. 8

3-2 RL BASE ASSEMBLY, RETAINER (Fig. 9)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to 1-1, remove the cassette compartment holder assembly.
- 3) Referring to 3-1, remove the LED base.
- 4) Remove the screw ●, and then, retainer ●.
- 5) Remove the screw ●, and then, RL base assembly ●.

2. Mounting

- 1) Select the **USE** mode.
 - 2) With the screw ●, mount the RL base assembly ● to the LS chassis.
 - 3) With the screw ● fix the retainer ● to the RL base assembly ●.
- When this is done, align the bump part ※ of the retainer ● with the bump part ※ of the guide rail T. (Fig. A)
- 4) Referring to 3-1, mount the LED base.
 - 5) Referring to 1-1, mount the cassette compartment holder assembly.

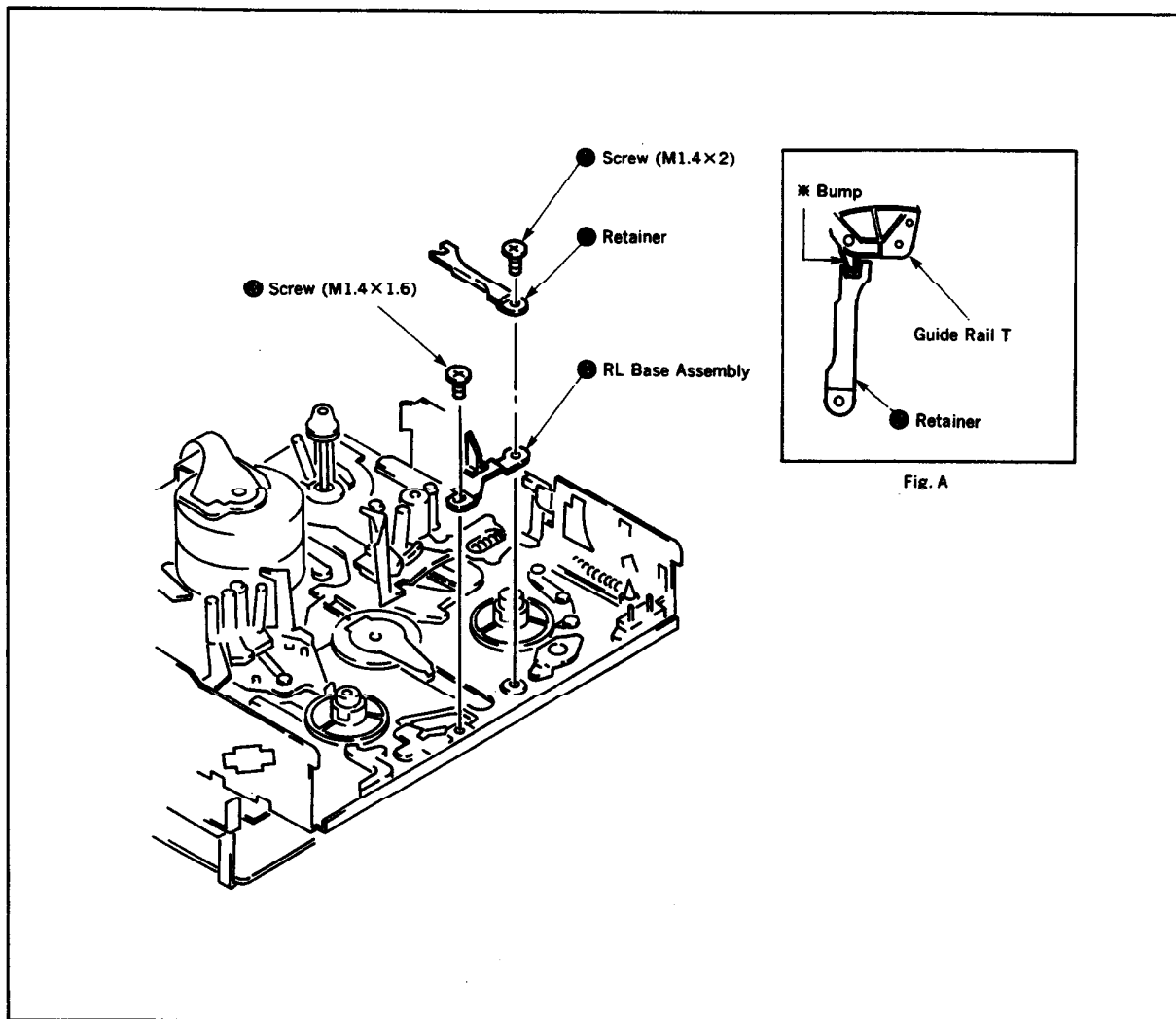


Fig. 9

3-3 TABLE ASSY, REEL, SUPPLY (Fig. 10)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to 1-1, remove the cassette compartment holder assembly.
- 3) Referring to 3-1, remove the LED base.
- 4) As shown in Fig. A, making use of slackness of the tension regulator string ● in the **USE** mode, remove the string out of the groove of the table assy, reel, supply ●. When this is done, be careful not to bend the tension regulator string ● and the S soft arm ● must be moved in a direction of the arrow ③.
- 5) Remove the table assy, reel, supply ●.

Note : Dismount and remount the table assy, reel, supply ●, holding the reel claw ✱.

2. Mounting

- 1) Select the **USE** mode.
- 2) As shown in Fig. B, move the S soft arm ● in a direction of the arrow ③.
- 3) Avoiding the tension regulator string ●, mount the table assy, reel, supply ● to the shaft ●.
- 4) Put the tension regulator string ● in the groove of the table assy, reel, supply ● and fit it properly by turning the table assy, reel, supply ●.
- 5) Referring to 3-1, mount the LED base.
- 6) Referring to 1-1, mount the cassette compartment holder assembly.

Note : Do not touch the tension regulator string ● with naked hand. Also, be careful of adhesion of grease, etc.

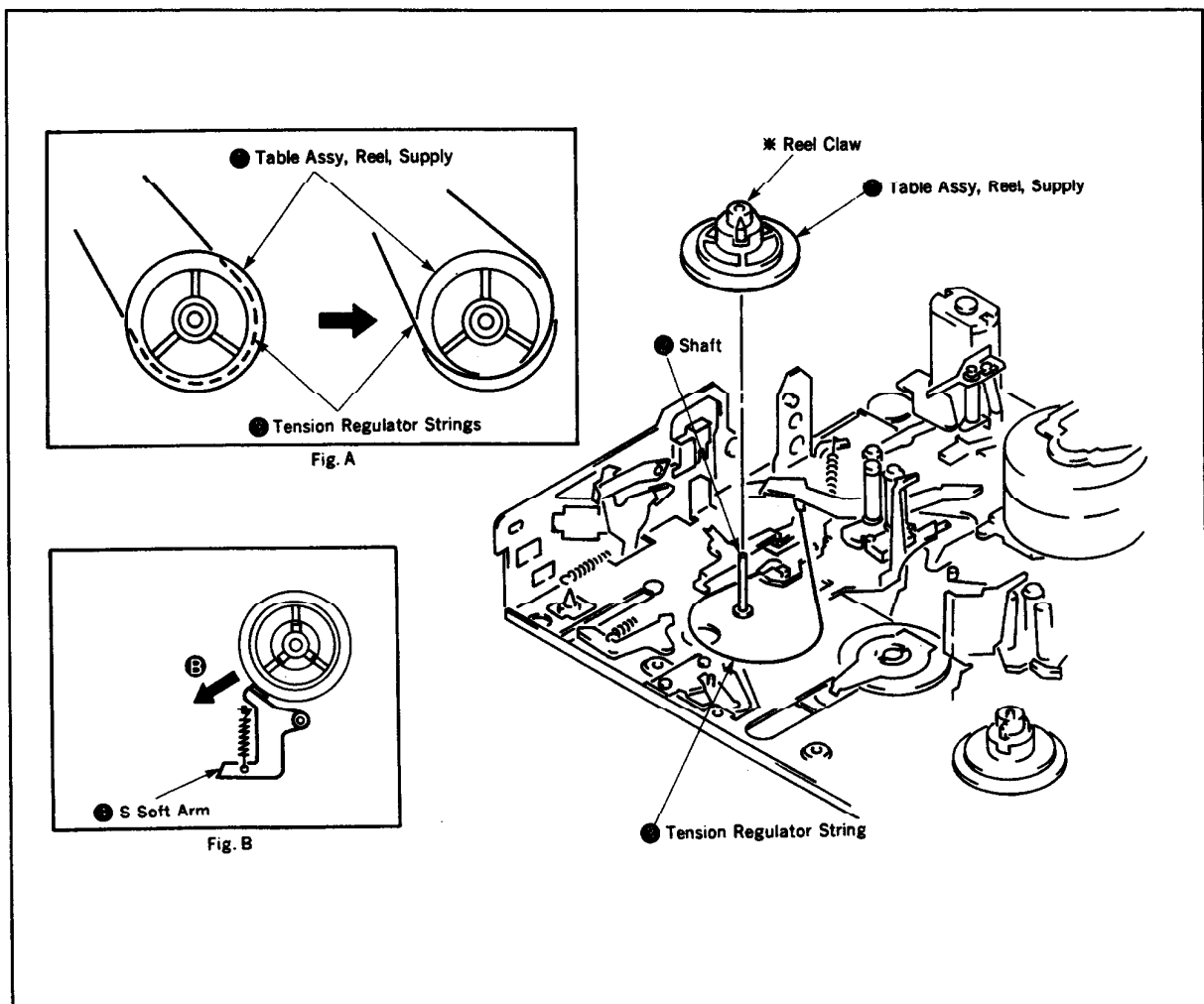


Fig. 10

3-4 TABLE ASSY, REEL, TAKE-UP (Fig. 11)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to 1-1, remove the cassette compartment holder assembly.
- 3) Referring to 3-1, remove the LED base.
- 4) Referring to 3-2, remove the retainer.
- 5) Dispace the T ratchet ● in a direction of the arrow **A**.
- 6) With the claw (T ratchet head) of the T ratchet ● moved in a direction of the arrow **B**, remove the Table assy, reel, take-up ●.

2. Mounting

- 1) Select the **USE** mode.
- 2) With the claw (T ratchet head) of the T ratchet ● moved in an arrow direction, mount the Table assy, reel, take-up ● to the shaft ●.
- 3) Referring to 3-2, mount the retainer.
- 4) Referring to 3-1, mount the LED base.
- 5) Referring to 1-1, mount the cassette compartment holder assembly.

Note : Dismount and remount the Table assy, reel, take-up ●, holding the reel claw *.

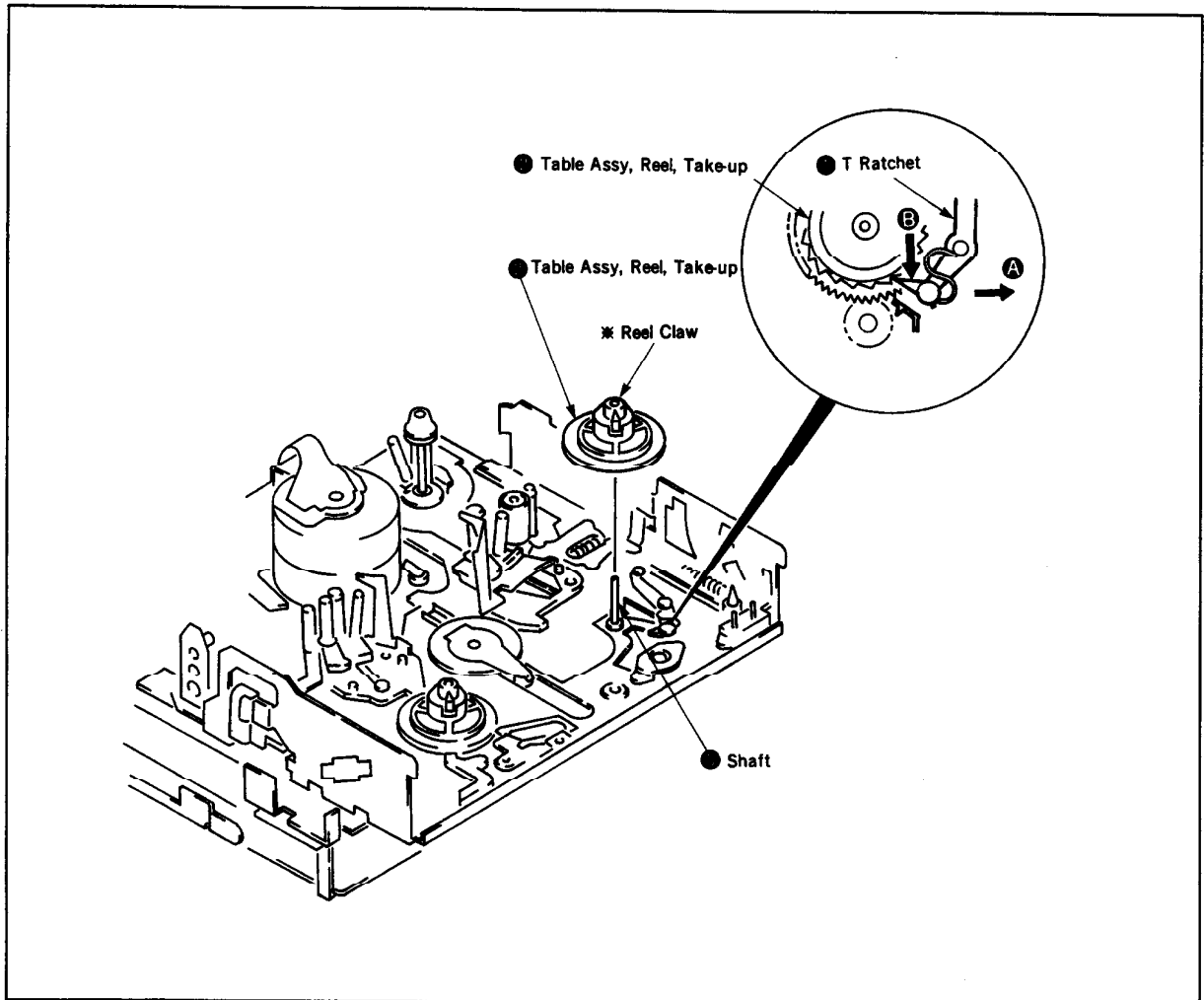


Fig. 11

3-5 ONEWAY CLUTCH ASSEMBLY (Fig. 12)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to the cassette compartment holder assembly.
- 3) Referring to 3-1, remove the LED base.
- 4) Remove the screw ●, and then, oneway clutch assembly ●.

2. Mounting

- 1) Select the **USE** mode.
- 2) Mount the oneway clutch assembly ● to the LS chassis and fix with the screw ●.
- 3) Referring 3-1, mount the LED base.
- 4) Referring to 1-1, mount the cassette compartment holder assembly.

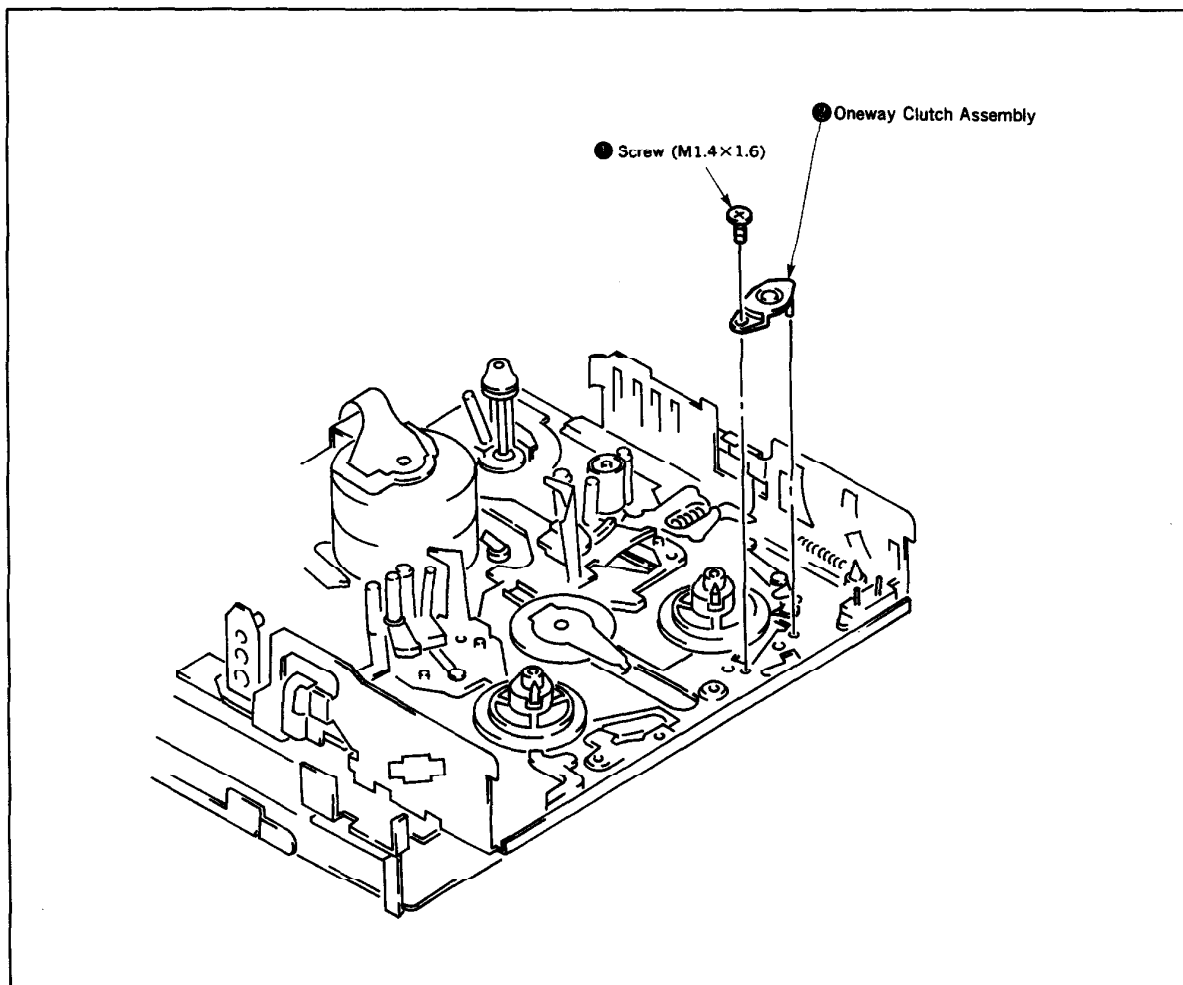


Fig. 12

3-6 S SOFT ARM ASSEMBLY (Fig. 13)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to 1-1, remove the cassette compartment holder assembly.
- 3) Referring to 3-1, remove the LED base.
- 4) Remove the lock washer ●, and then, the spring, tension ●.
- 5) Remove the S soft arm assembly ● by rotating it in an arrow direction (until the hook ● comes off the LS chassis).

2. Removal

- 1) Select the **USE** mode.
- 2) As shown in Fig. A, apply a quarter drip of oil to the arrow indicated part of the shaft ●.
- 3) Mount the S soft arm assembly ● to the shaft ●, rotating it in the arrow direction. (Be careful not to bend the hook ●.)
- 4) Hook the spring, tension 2 onto the claw and fix it with lock washer 1.
- 5) Referring to 3-1, mount the LED base.
- 6) Referring to 1-1, mount the cassette compartment holder assembly.

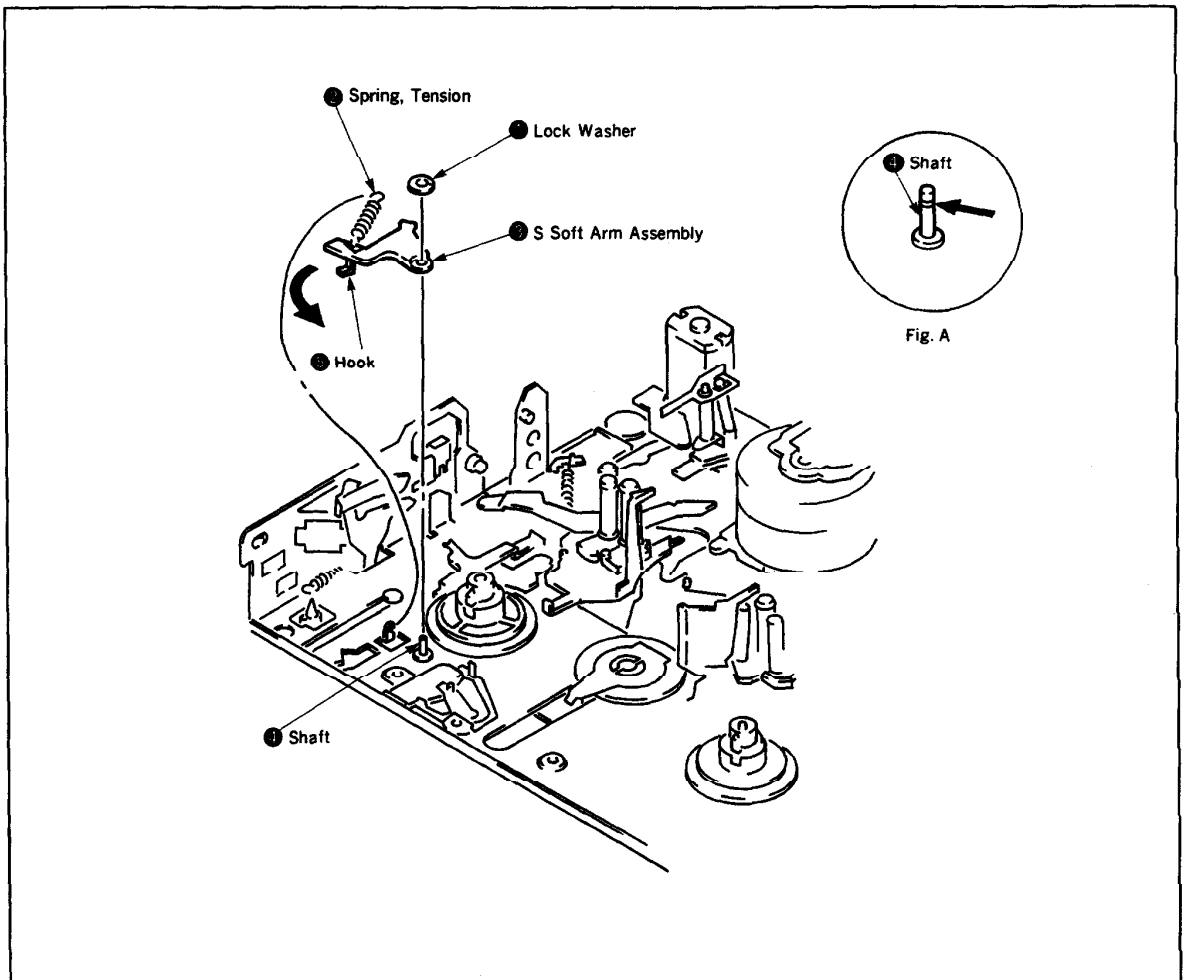


Fig. 13

3-7 LS CHASSIS ASSEMBLY (Fig. 14)

1. Removal

- 1) Select the **USE** mode.
- 2) Referring to 1-1, remove the cassette compartment holder.
- 3) Referring to 3-1, remove the LED base.
- 4) Referring to 3-2, remove the RL base assembly and retainer.
- 5) Remove the lock washer ①, and then, arm assy gear ②.
- 6) Select the **Q, REW** mode.
- 7) Remove the flexible rotary shaft ③, and then, the flexible connector ④.
- 8) Remove the E retaining ring ⑤ and three screws ⑥.
- 9) Remove the LS chassis assembly ⑦ in a direction of the arrow **D**.

2. Mounting

- 1) As shown in Fig. A, apply Molyton grease to the arrow-indicated part of the LS chassis assembly ⑦.
- 2) Unload in the RDY mode. Start docking in the **Q, REW** mode after first GL. When docking the mechanical chassis and LS chassis assembly ⑦, it is necessary to place the following parts at specified positions.
- 3) Put the pin ② of the pinch arm assembly ② into the left side of the pinch press arm assembly ②. (Fig.19)
- 4) Move the TG-1 arm assembly ① in a direction of the arrow **A** to put the pin ① into the concave of the arm assembly ①. (Fig. 17)
- 5) put the pin ③ of the S ratchet ③ into the right side the of the arm assembly ①. (Fig. 17)

Simultaneously performing the operations above, push the roller of the guide lock arm ⑧ With the arm arc portion of the guide arm T assembly ⑧ (Fig. 15) to push the LS chassis assembly ⑦ in a direction of the arrow **E**, and at the same time, engage the claws of the guide rail base 1 ⑩, guide rail base 2 ⑪ and guide rail base 3 ⑫ with those of the guide rail S ⑬ and guide rail T ⑭. (Fig. 16)

Then, align the shafts ⑨ of the mechanical chassis With the four long joints of the LS chassis assembly ⑦, and put the LS pin ① of the LS arm assembly ② in the groove of the LS cam plate ③. (Fig.18)

Note : Before docking, confirm that both EJ arm and LS arm are deeply inserted into the shafts. (If not properly fit, the set does not function even if the LS chassis is docked.

- 6) Mount the E retaining ring ⑤ and three screws ⑥.
- 7) Mount the flexible rotary shaft ③ and flexible connector ④.
- 8) Select the **USE** mode.
- 9) Mount the arm assy gear ② and fix with the lock washer ①.
- 10) Referring to 3-2, mount the RL base assembly and retainer.
- 11) Referring to 3-1, mount the LED base.
- 12) Referring to 1-1, mount the cassette compartment holder assembly.

Note : Using the mode selector, confirm that loading and unloading are performed smoothly.

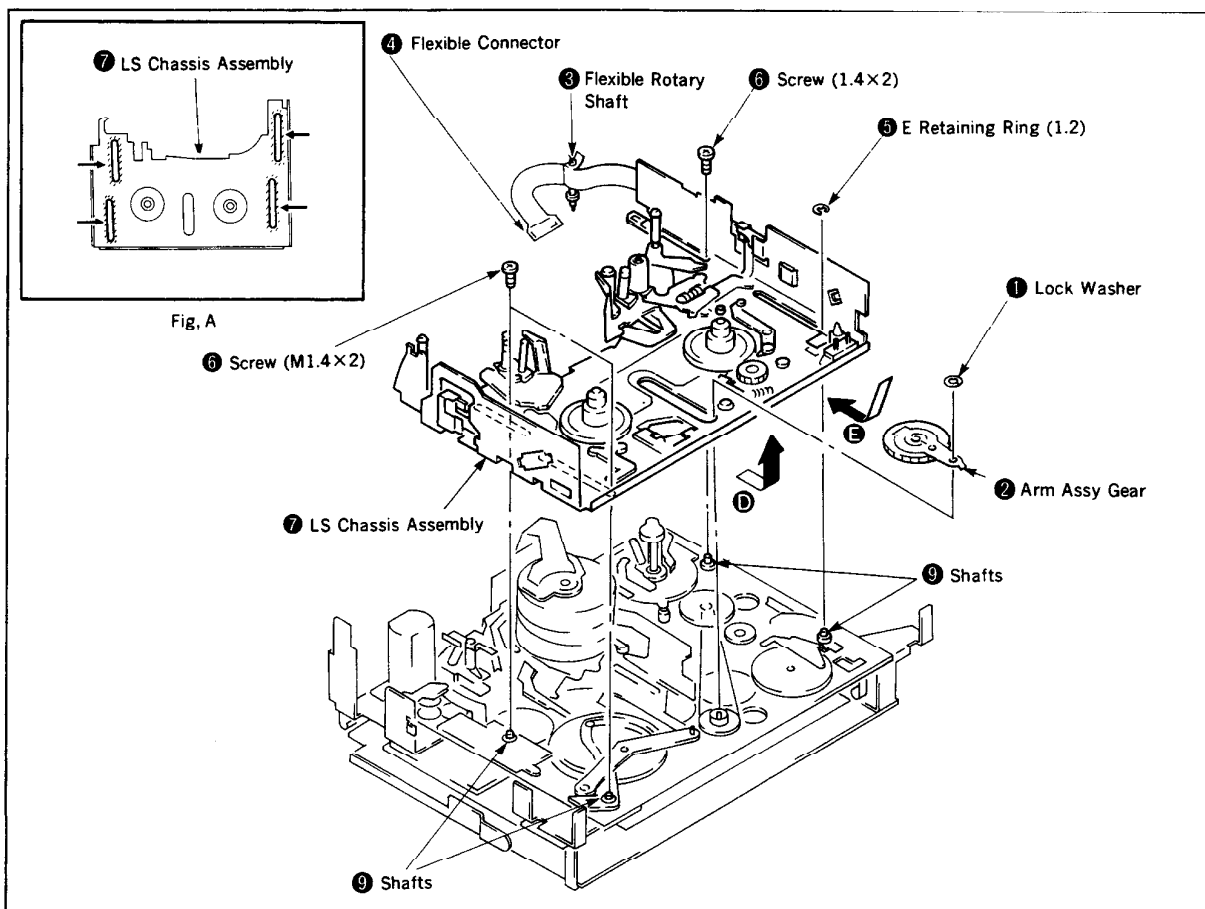


Fig. 14

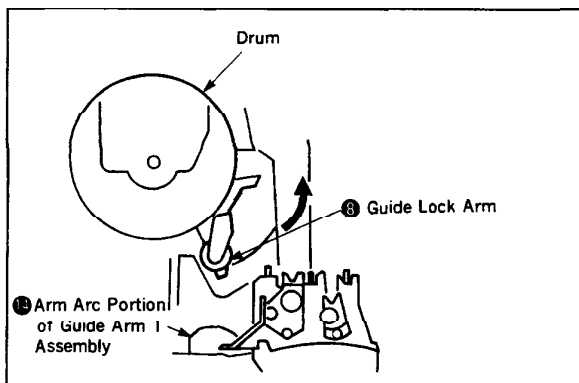


Fig. 15

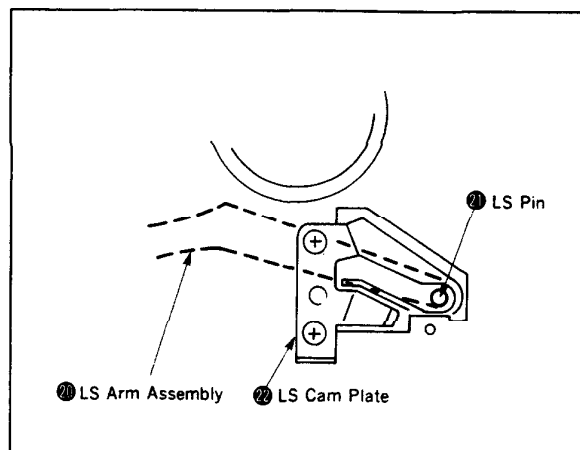


Fig. 18

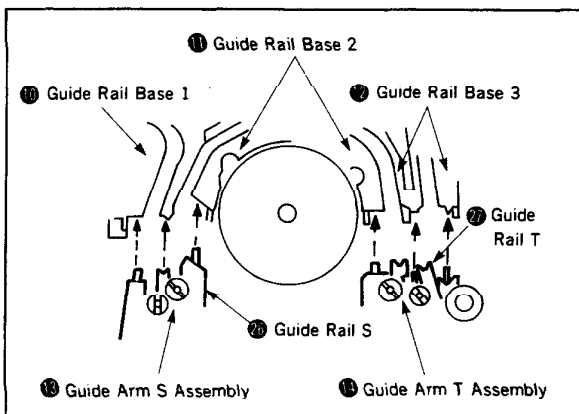


Fig. 16

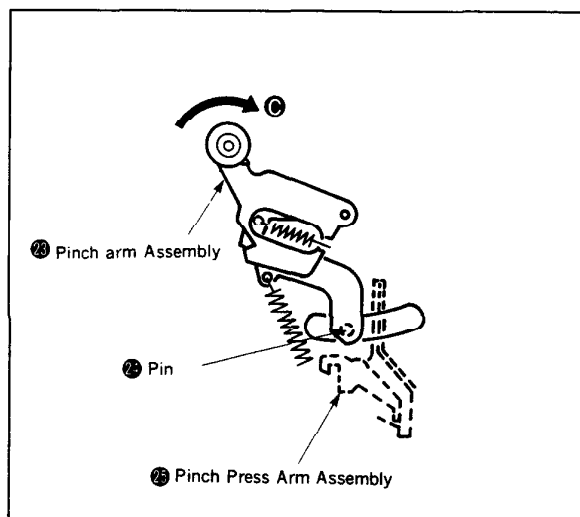


Fig. 19

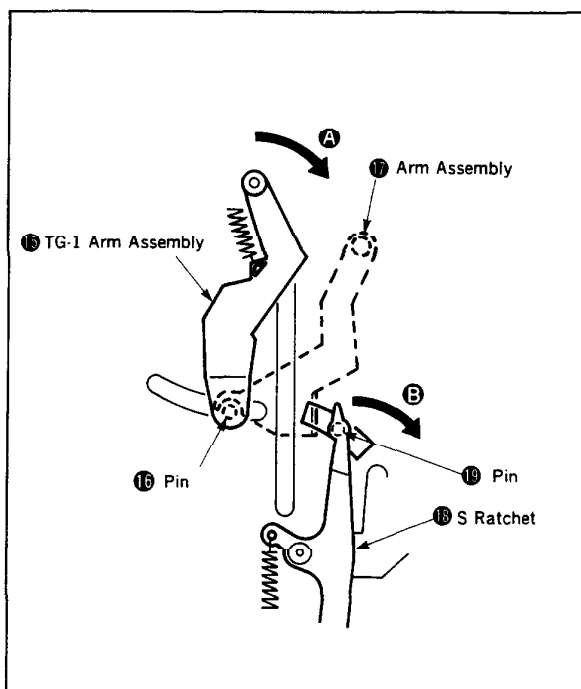


Fig. 17

3-8 PINCH ARM ASSEMBLY (Fig. 20)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis assembly.
- 3) Remove the lock washer ② from the back of the LS chassis assembly ①.
- 4) Remove the spring, tension ③, and then, pinch arm assembly ④.

2. Mounting

- 1) As shown in Fig. A, apply oil to the hole of the boss ⑤ over one third of a drip up to half a drip.
- 2) put the rotation center of the pinch arm assembly in the boss ⑤ hole, and the pin ⑥ in the long hole.
- 3) Hook the spring, tension ③ onto the upper groove of the pinch return spring shaft ⑦.
- 4) Mount the lock washer ② from the back of the LS chassis assembly ①.
- 5) Referring to 3-7, mount the LS chassis assembly.
- 6) Referring to 1-1, mount the cassette compartment holder assembly.

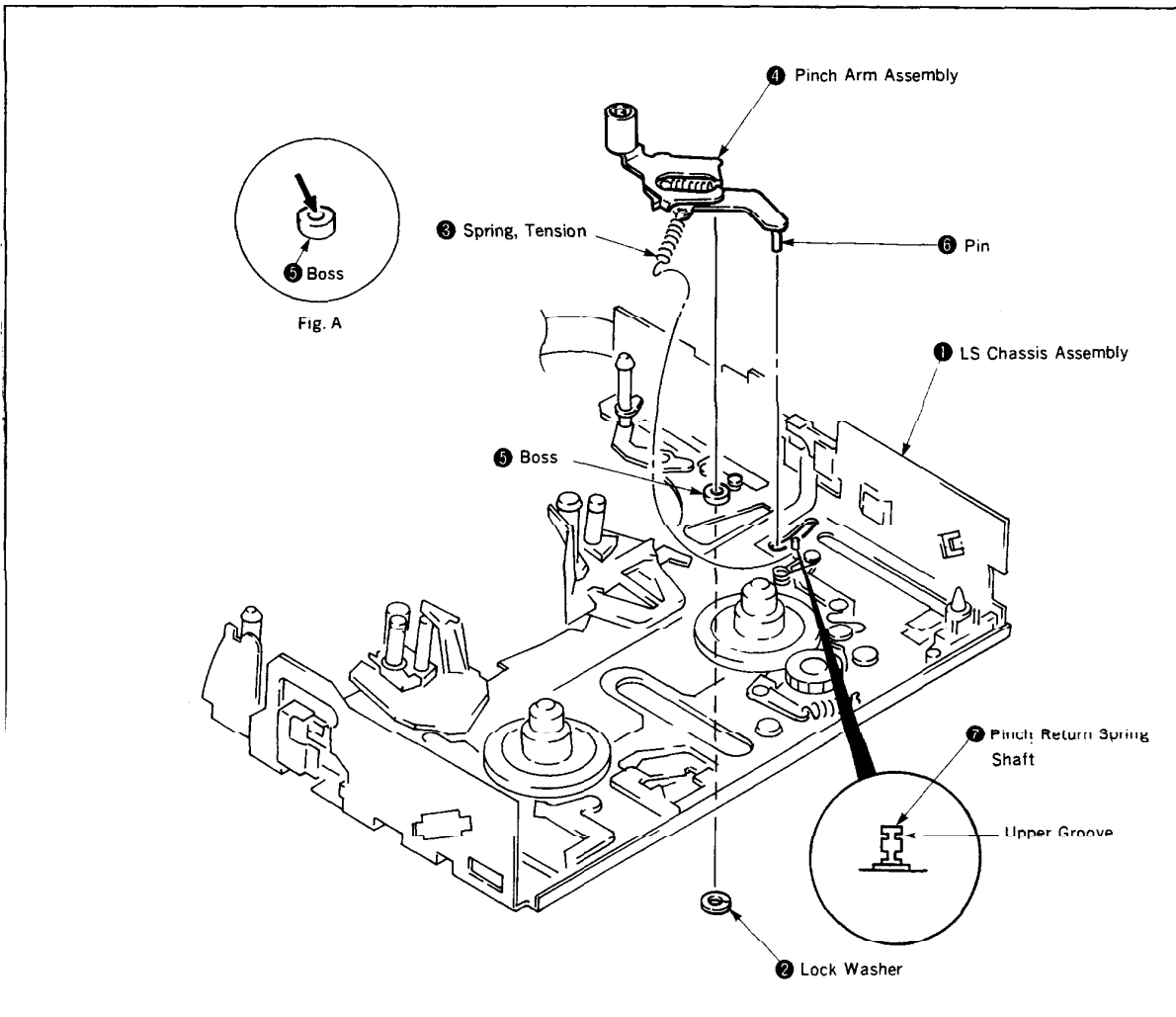


Fig. 20

3-9 TG-11 ARM ASSEMBLY (Fig. 21)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis assembly.
- 3) Remove the lock washer ② from the back of the LS chassis assembly ①.
- 4) Remove the TG-11 arm assembly ③ and spring, torsion ④.

Note : Be careful not to deform the TG-11 arm.

2. Mounting

- 1) As shown in Fig. A, apply oil to a boss hole over one third of a drip up a half a drip.
- 2) As shown in Fig. B, put the longer arm of the spring, torsion ④ between the pinch arm boss ⑤ and cam slider shaft ⑧ of the LS chassis. Next, Hook the shorter arm of the spring, torsion ④ around the pin ⑥ of the TG-11 arm assembly ③, rotate the TG-11 arm assembly and fix with the lock washer ②. When this is done, see to it that the pin ⑥ of the TG-11 arm assembly ③ is located to the left side of the cam slider ⑨ as shown in Fig. C.
- 3) Referring to 3-7, mount the LS chassis.
- 4) Referring to 1-1, mount the cassette compartment holder.

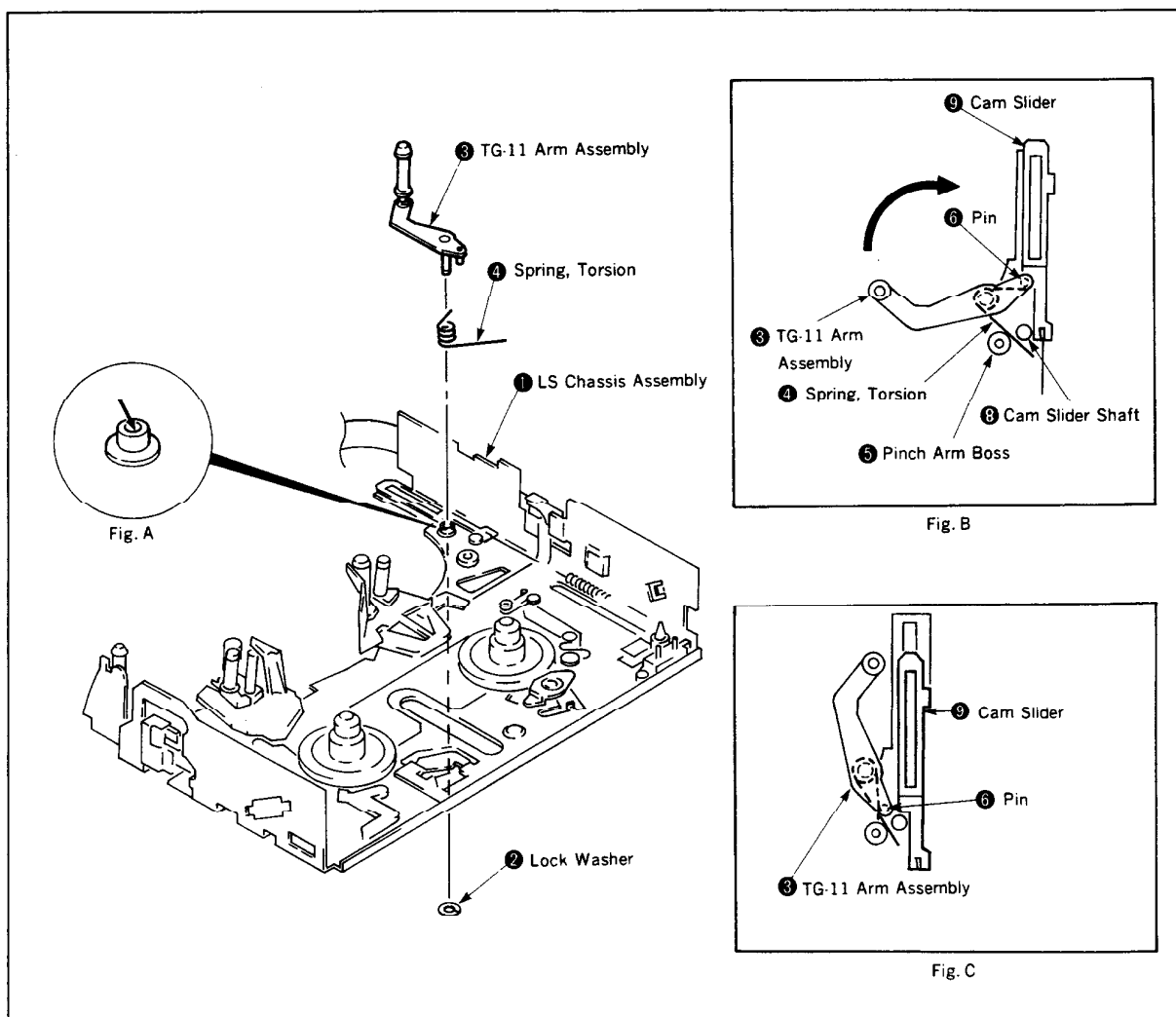


Fig. 21

3-10 TG-1 ARM ASSEMBLY (Fig. 22)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis.
- 3) Referring to 3-3, remove the table assy, reel, supply.
- 4) Remove the lock washer ② from the back of the LS chassis assembly ①.
- 5) Remove the spring, tension ③. Remove the string joint ④ from the dowel ⑤ of the TG-1 adjustment block ⑨ by rotating it in a direction of the arrow A as shown in Fig. C.
- 6) Remove the TG-1 arm assembly ⑥.

Note : Dismount and remount the string joint ④ carefully not to deform it.

2. Mounting

- 1) As shown in Fig. A, apply oil to the hole of the boss ⑦ over one third of a drip up to half a drip.
- 2) As shown in Fig. C, mount the string joint ④ to the TG-1 adjustment block ⑨ in the opposite direction of the arrow A.
- 3) Mount the TG-1 arm assembly ⑥ to the boss ⑦ in such a manner not to touch the guide and insert the pin ⑧ into the long hole.
- 4) Hook the spring, tension ③ onto the position shown in Fig. B.
- 5) Mount the lock washer ② from the back of the LS chassis assembly ①.
- 6) Referring to 3-3, mount the table assy, reel, supply.
- 7) Referring to 3-7, mount the LS chassis assembly.
- 8) Referring to 1-1, mount the cassette compartment holder assembly.

Note : Referring to 3-27, adjust a tension regulator position.

Note : Referring to 3-28, adjust a FWD back tension.

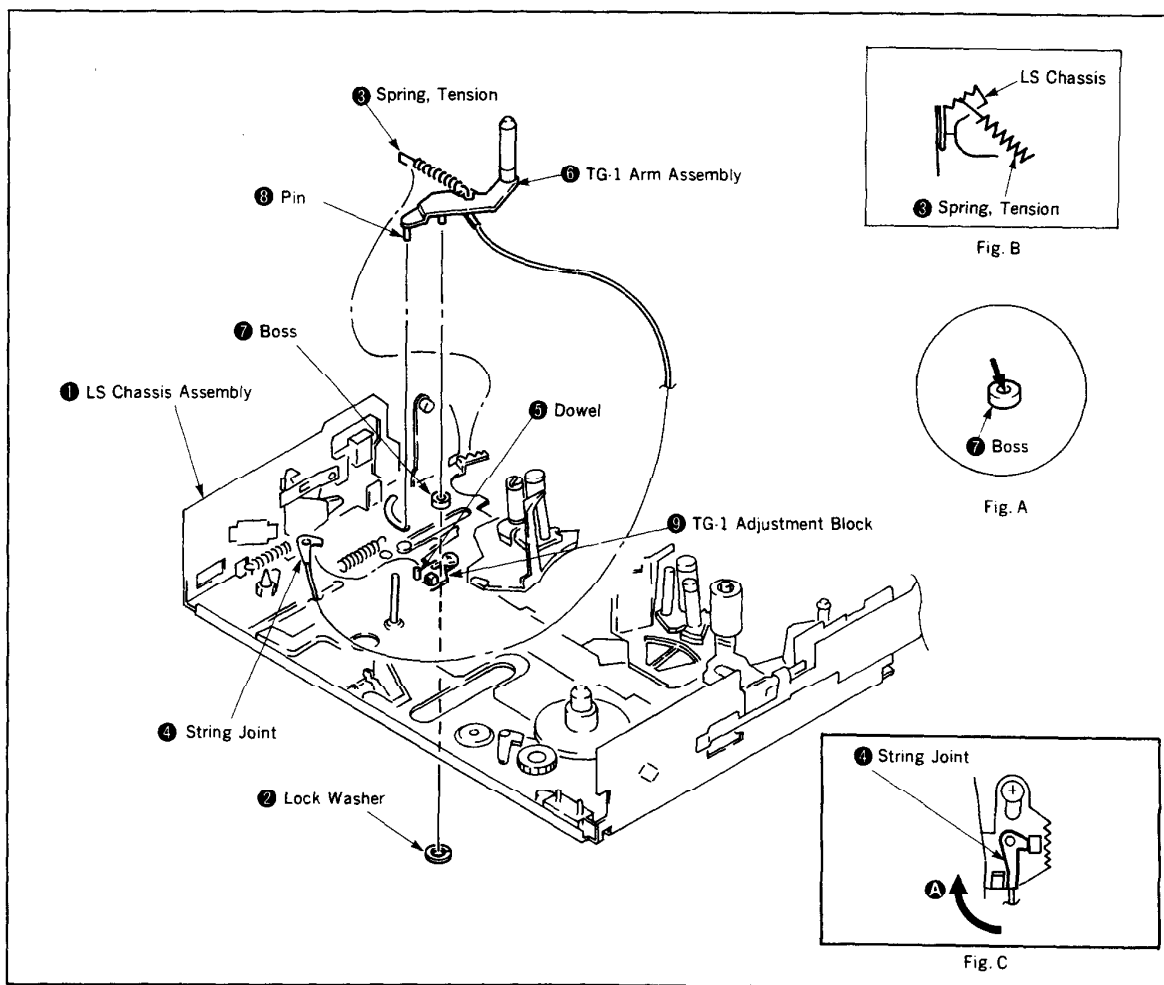


Fig. 22

3-11 STRING JOINT (Fig. 23)

1. Removal

- 1) Referring to 3-10, remove the TG-1 arm assembly ①.
- 2) Remove the joint holder ②, and then, string assembly ③.

2. Mounting

- 1) Put the dowel ④ of the TG-1 arm assembly ① into the hole of the string assembly ③ and mount the joint holder ②. (Apply screw lock between the joint holder and TG-1 arm assembly.)
- 2) Referring to 3-10, mount the TG-1 arm assembly ①.

Note : Be careful not to bend the string assembly ③.

Note : Do not touch the guide *.

Note : The joint holder ②, which was removed once, must not be used again.

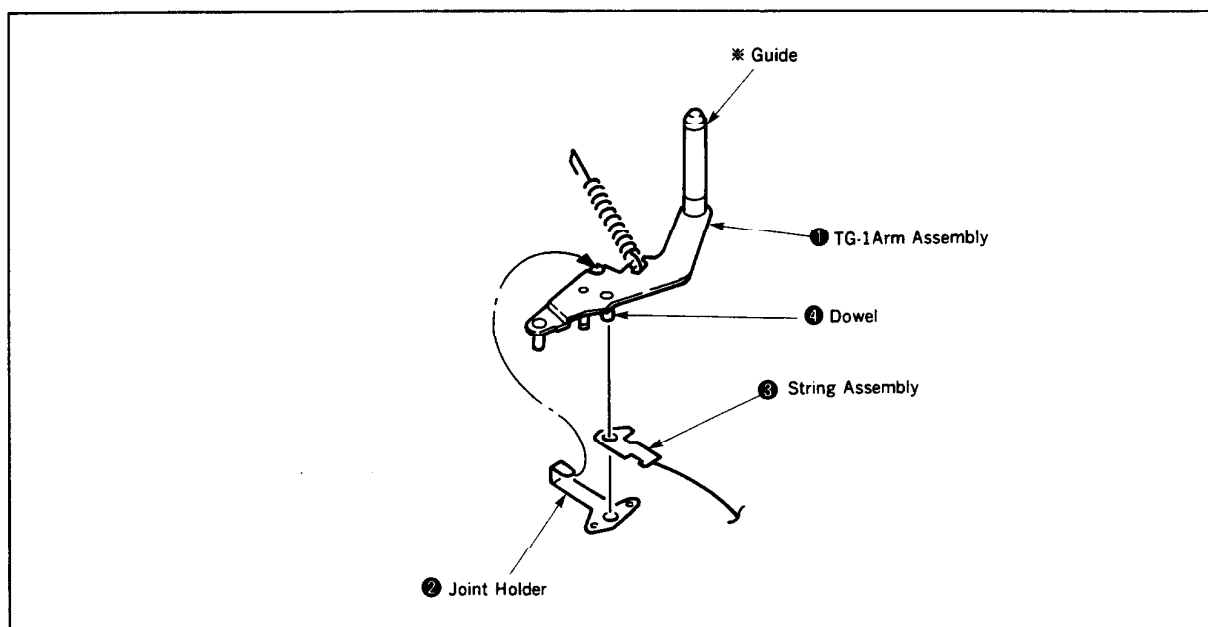


Fig. 23

3-12 GUIDE ARM T ASSEMBLY, GUIDE ARM S ASSEMBLY

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis assembly.
- 3) Rotate the guide arm T assembly ① and guide arm S assembly in arrow directions respectively, align their shafts ③ with the holes as shown in Fig. A, and remove them. (Fig. 24)

Note : Do not touch the guide *. (Fig. 25 and Fig. 26)

2. Mounting

- 1) After inserting the guide arm T and S assemblies in the reverse order of removal, rotate them in the opposite directions of the arrows respectively.
- 2) Fit the TG-7 base assembly ⑤ and TG-9 base assembly ⑥ in the grooves of the guide rail T ④. (Fig. 25)
- 3) Put the shaft ③ flange in the long groove of the guide rail S ⑧, and fit the TG-4 base assembly ⑨ and TG-6 base assembly ⑩ into the right and left grooves of the guide rail S ⑧ respectively.

When this is done, see to it that the flat spring of the TG-6 base assembly ⑩ is located below the guide rail S ⑧ as shown in Fig. B. (Fig. 26)

- 4) Referring to 3-7, mount the LS chassis assembly.
- 5) Referring to 1-1, mount the cassette compartment holder assembly.

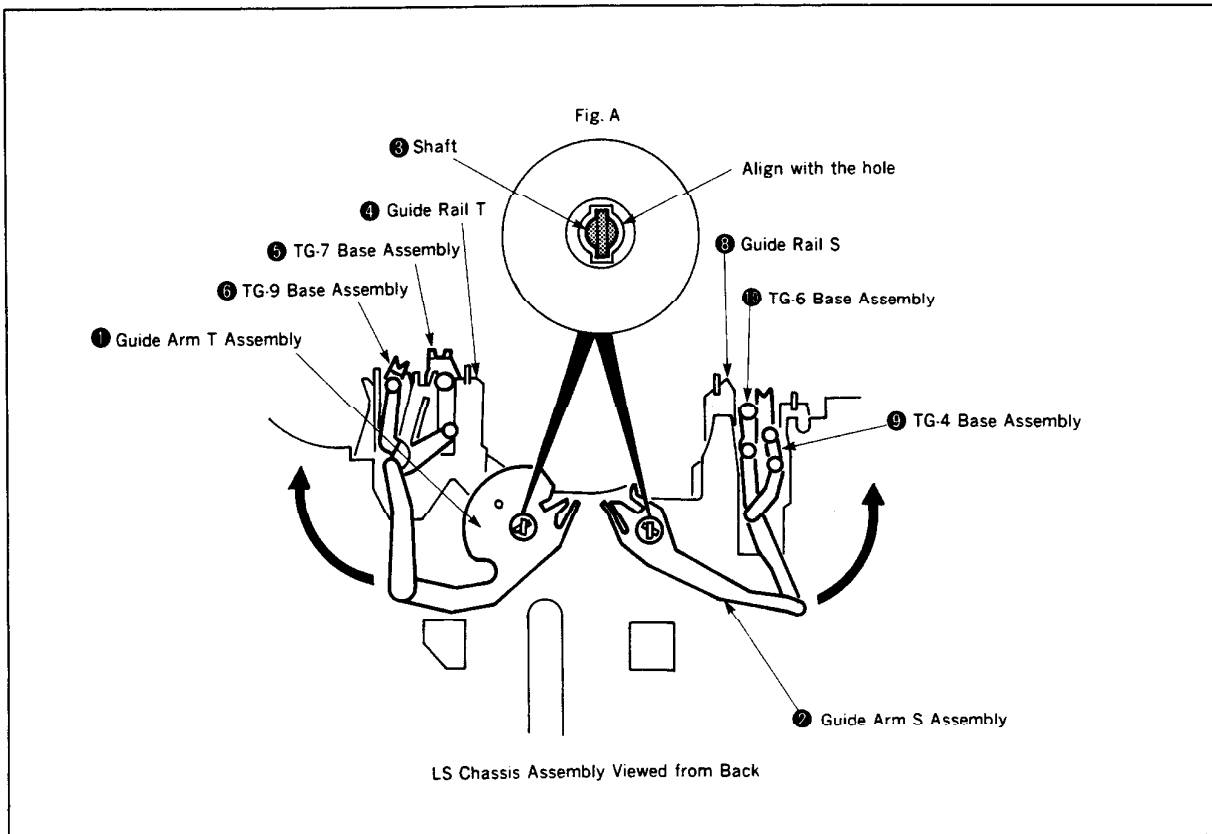


Fig. 24

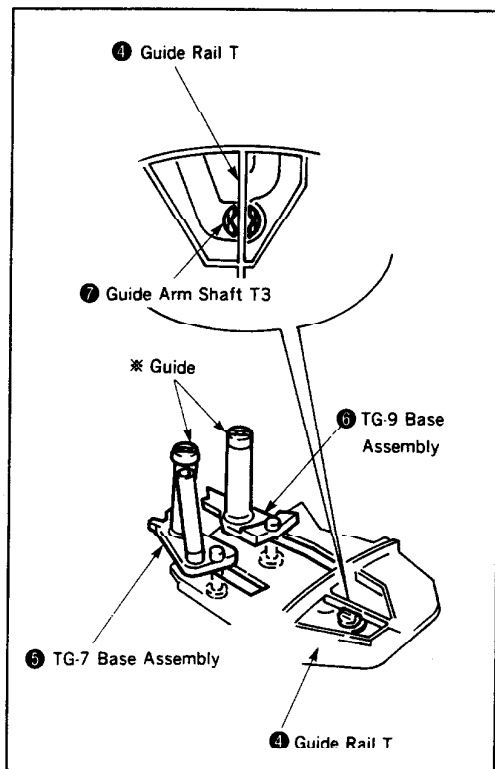


Fig. 25

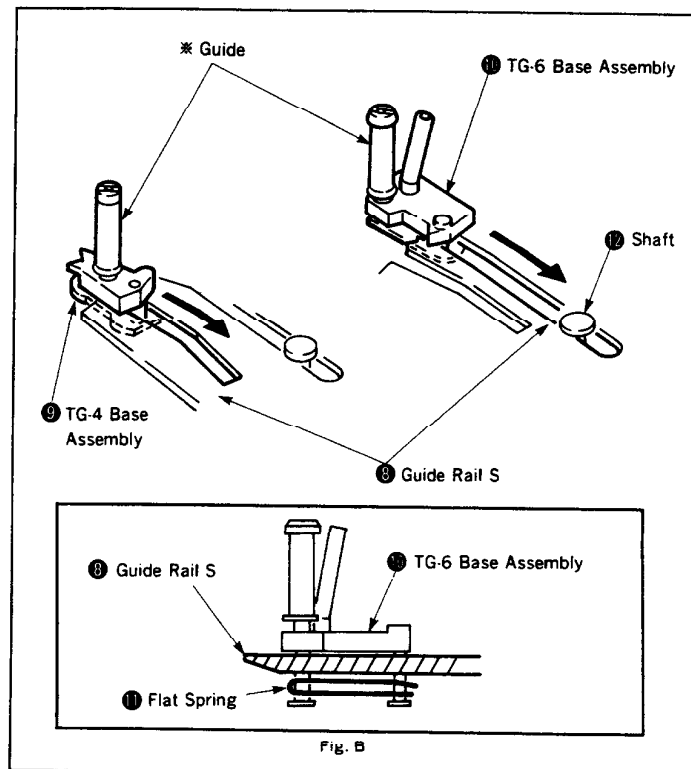


Fig. 26

3-13 PINCH PRESS ARM ASSEMBLY (Fig. 27)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis.
- 3) Remove the screw ❶, and then, pinch press arm assembly ❷.

2. Mounting

- 1) As shown in A, apply half a drip of molyton grease to an arrowindicated part of a boss hole.
- 2) As shown in Fig. B, apply half a drip of molyton grease each to the pinch press arm assembly ❷ at 3 places.
- 3) Put the pin ❸ of the pinch press arm assembly ❷ in the groove of the cam B ❹.
- 4) Fix. with the screw ❶.
- 5) Referring to 3-7, mount the LS chassis assembly.
- 6) Referring to 1-1, mount the cassette compartment holder assembly.

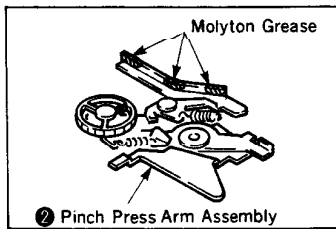


Fig. B

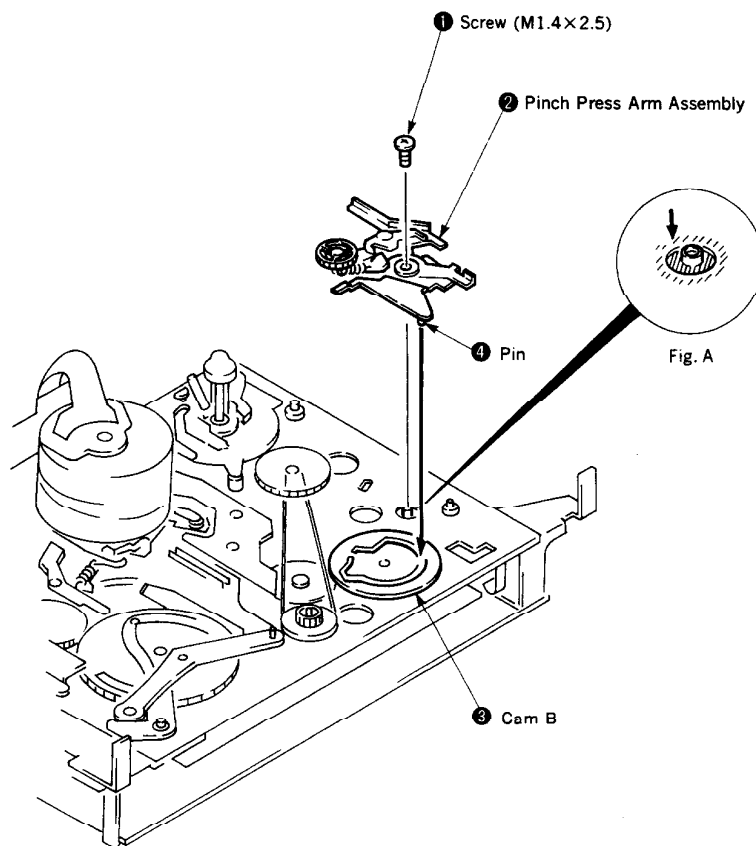


Fig. 27

3-14 GL SLIDER ASSEMBLY (Fig. 28)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis assembly.
- 3) Referring to 3-15, remove the cam A.
- 4) Shift the GL slider assembly ④ in a direction of the arrow A.
- 5) Remove the screw ①, and then, GL support S ②.
- 6) Remove the lock washer ③, and then, GL slider assembly ④.

2. Mounting

- 1) Fit the claw ⑤ of the GL slider assembly ④ in the groove of the GL support T ⑦, and put the roller ⑥ in the long hole of the chassis.
- 2) Stop with the lock washer ③.
- 3) Shift the GL slider assembly ④ in a direction of the arrow A.
- 4) Fit the claw ⑧ of the GL support ② in the part of the chassis marked with * and place the dowel ⑨ in the hole of the chassis.
- 5) Fix with the screw ①.
- 6) Referring to 3-7, mount the LS chassis assembly.
- 7) Referring to 1-1, mount the cassette compartment holder assembly.

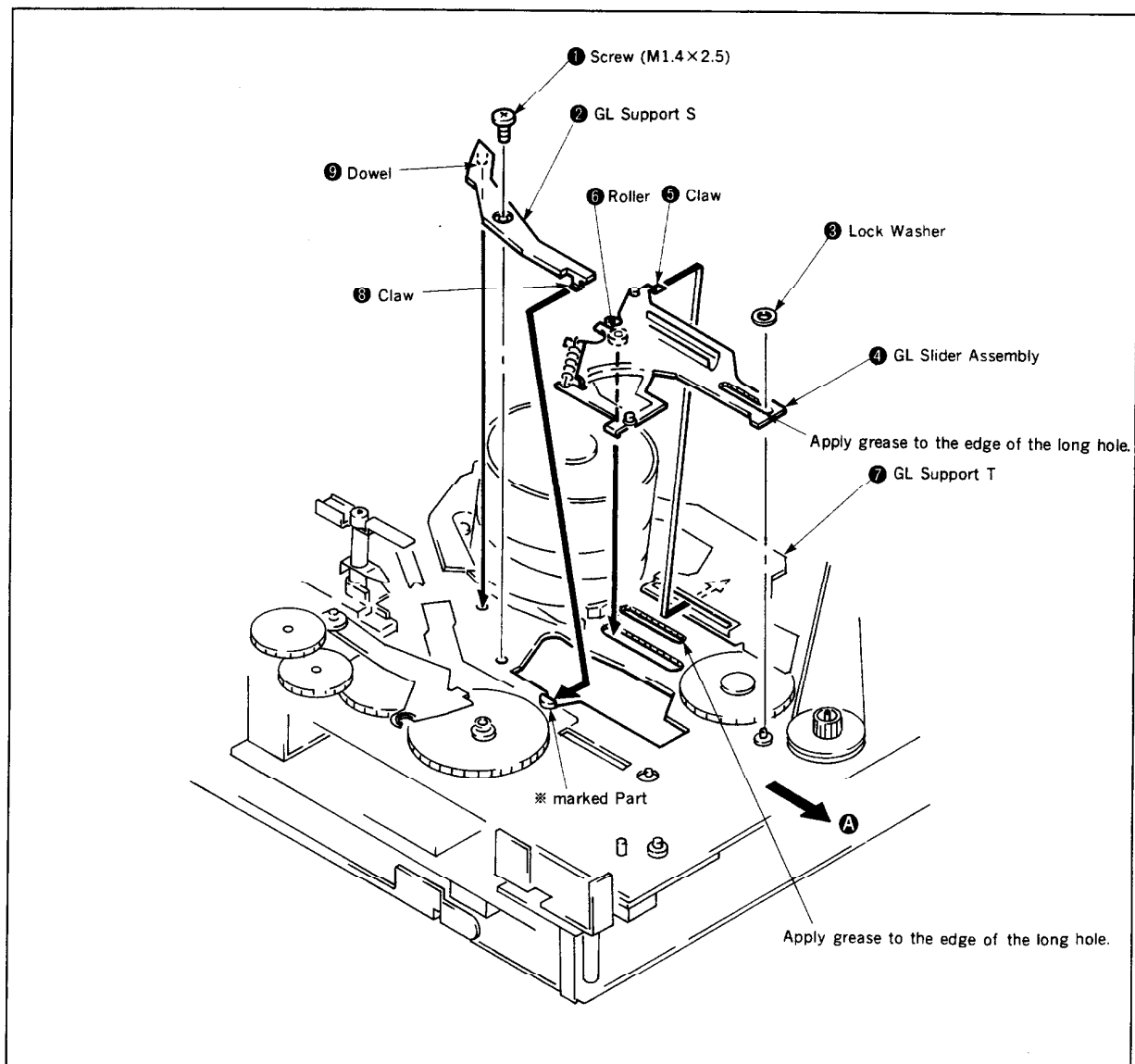


Fig. 28

3-15 PHASE ADJUSTMENT(Fig. 29)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis. (When this is done, one of the BLANK, REC and READY modes must be selected.)
- 3) Remove the two screws ①, and remove the TG-1 cam base ② by moving it in a direction of the arrow A. (Remove the notch ③ from the groove of the No. 3 gear shaft.)
- 4) Remove the screw ④, and remove the gear retainer ⑤ by sliding it in a direction of the arrow B.
- 5) Remove the arm assembly ⑥, No. 0 gear ⑦, No. 1 gear assembly ⑧, No. 2 gear assembly ⑨, No. 3 gear assembly ⑩, lock washer ⑪, and then, mode gear assembly ⑫, respectively.
- 6) Being careful not to lose the LS roller ⑬ of the LS arm, remove the LS arm assembly ⑭ and EJ arm ⑮, respectively.
- 7) Remove the screw ⑯, and then, cam A ⑰.
- 8) Referring to 3-13 3), remove the pinch press arm assembly.
- 9) Remove the screw ⑱, and then, cam B ⑲.

2. Adjustment and Mounting

- 1) Face the hole ① of the mode gear assembly ⑫ to a direction of the arrow A, move the GL slider assembly ⑬ in a direction of the arrow B, apply molyton grease to the pin of the GL slider assembly ⑬, and mount the LS roller ⑬. (Fig. 30)
- 2) Set a direction of the cam A ⑰ so that the hole ② of the cam A ⑰ will be aligned with the hole of the mechanical chassis. (Fig. 31)

- 3) Move the GL slider ⑬ so that the LS roller ⑬ will be placed into the groove ④ of the cam A ⑰. At the same time, engage the mode gear assembly ⑫ with the gear of the relay gear A ⑰, and mount the cam A ⑰. Insert a stick of about $\phi 1.5\text{mm}$ in the hole ③ of the cam A ⑰. (Fig. 31)
- 4) Align the hole ⑤ of the cam B ⑲ with the hole of the mechanical chassis. At the same time, engage the relay gear B ⑲ with the gear and mount it. (Fig. 32)
- 5) Referring to 3-13, mount the pinch press arm assembly.
- 6) Align the hole ⑥ of the No. 3 gear assembly ⑩ with the hole of the mechanical chassis, and at the same time, engage the mode gear assembly ⑫ with the gear to mount. (Fig. 33)
- 7) Mount the No. 2 gear assembly ⑨, No. 1 gear assembly ⑧ and No. 0 gear ⑦ in that order. Mount the arm assembly ⑥ to the shaft and put the pin ⑦ in the groove of the No. 3 gear assembly ⑩, (Fig. 34)
- 8) Put the TG-1 cam base ② in place, fit the notch ③ to the shaft and shift it in an arrow direction, and mount the screws ① and ④ in that order. (Fig. 35)
- 9) Put the gear retainer ⑤ in place, slide it in an arrow direction and fix it with the screw ④. (Fig. 36)
- 10) Seeing to it that the EJ arm ⑮ and the LS roller ⑬ of the LS arm assembly ⑭ are put in the groove ④ of the cam A ⑰, mount them in that order. (Fig. 29 and Fig. 30)
- 11) Referring to 3-7, mount the LS chassis assembly.
- 12) Referring to 1-1, mount the cassette compartment holder assembly.

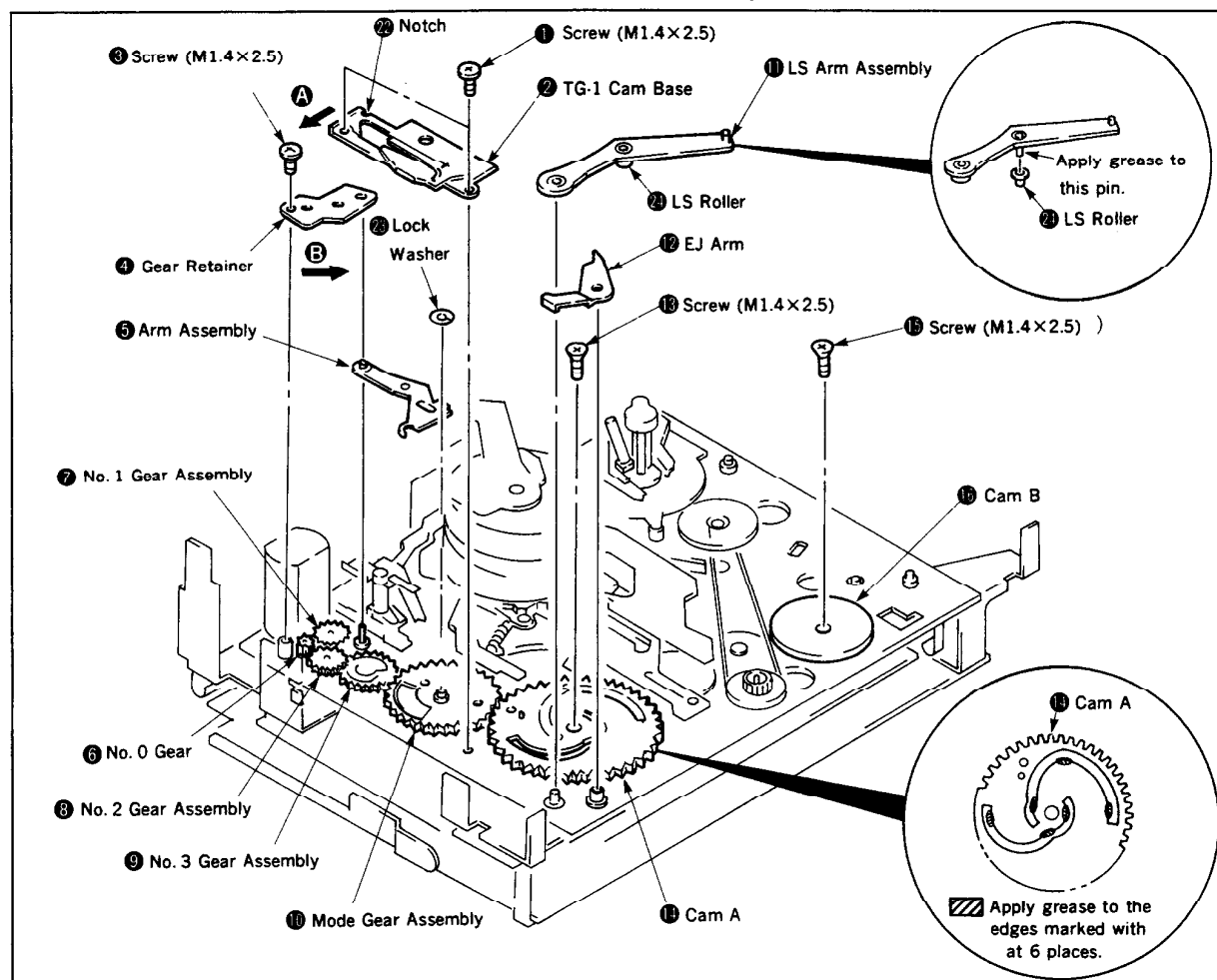


Fig. 29
-27-

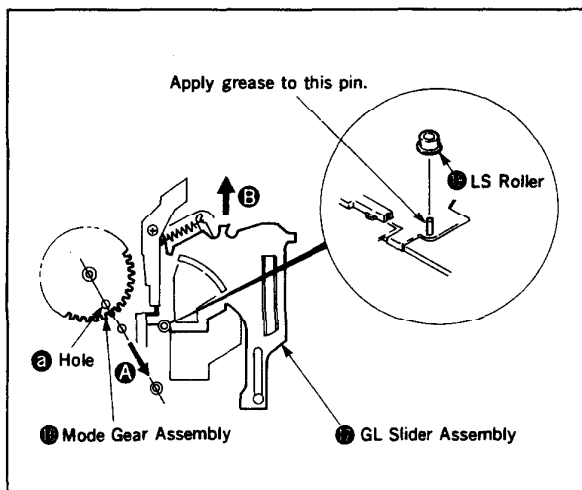


Fig. 30

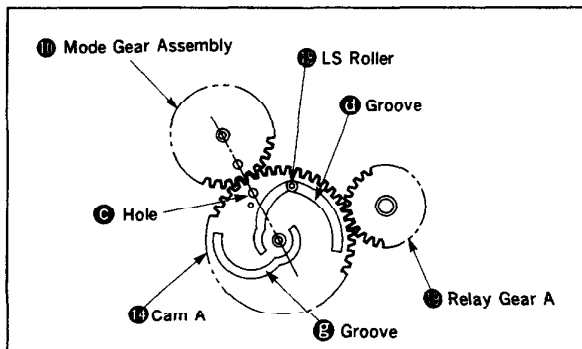


Fig. 31

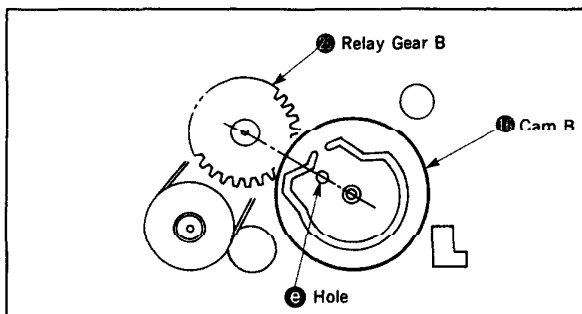


Fig. 32

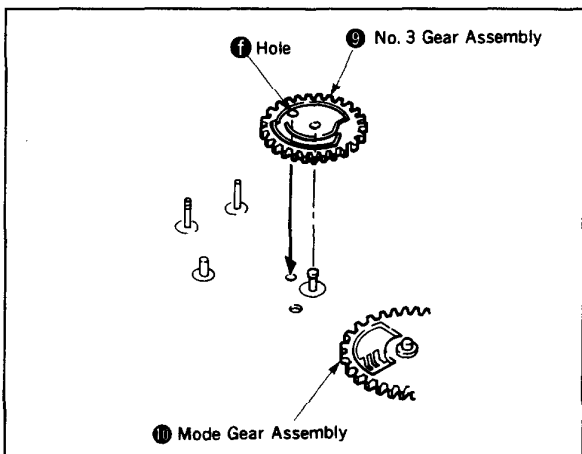


Fig. 33

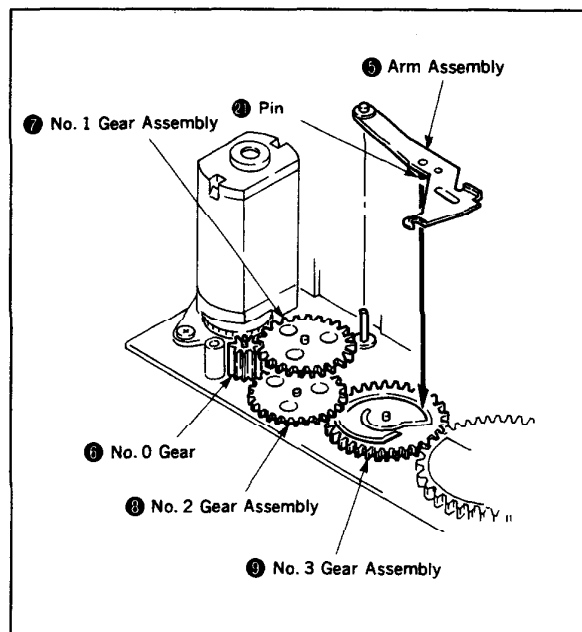


Fig. 34

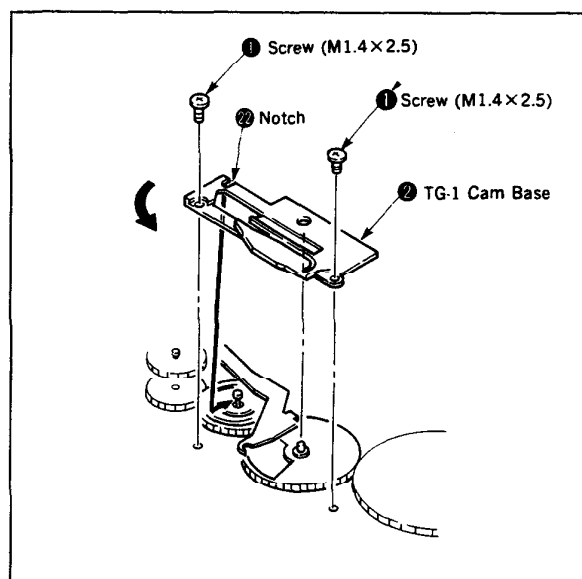


Fig. 35

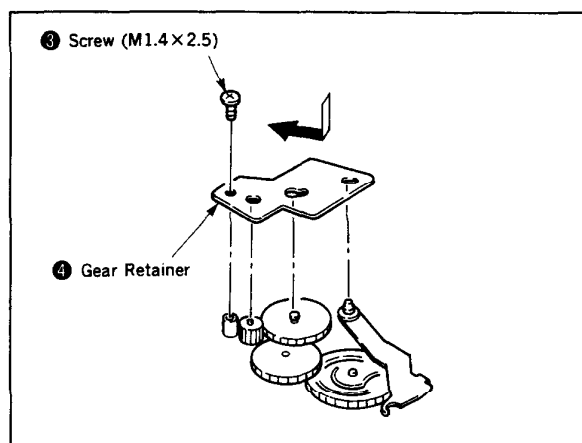


Fig. 36

3-16 GEAR TRAIN OPERATION CHECK (Fig. 37)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-7, remove the LS chassis.
- 3) Referring to 3-17, remove the loading motor.

2. Check

- 1) Insert the tip of tweezers into the hole a of the cam A ①.
- 2) Rotate the cam A ① by about two thirds of a turn in a direction of the arrow A, and then, in a direction of the arrow B by the same amount. Repeat this 3 times.
- 3) When this is done, check that each, gear, the GL slider assembly and LS arm assembly rotate smoothly, and that no load is applied to them.

- 4) At the same time, check that the LS roller ② is located almost at the end point of the groove of the cam A ① when the gear train comes into contact with the stoppers at both ends.

Note : When rotating the cam A ① with the tip of tweezers, etc., be careful not to scratch the mechanical chassis.

3. Mounting

- 1) Referring to 3-17, mount the loading motor.
- 2) Referring to 3-7, mount the LS chassis assembly.
- 3) Referring to 1-1, mount the cassette compartment holder assembly.

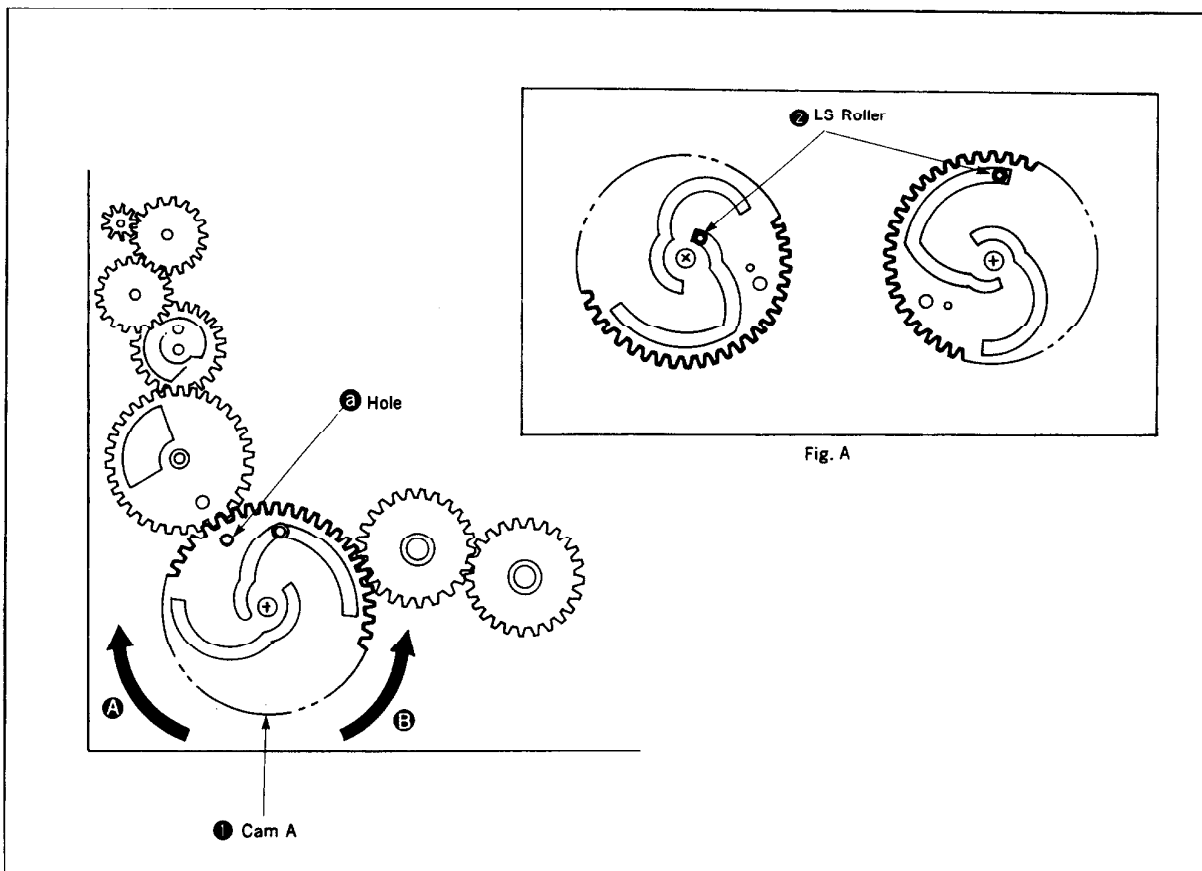


Fig. 37

3-17 LOADING MOTOR ASSEMBLY (Fig. 38)

1. Removal

- 1) Remove the LB-12 board.
- 2) Remove the connector ❶.
- 3) Remove the screws ❸ and ❹, and remove the loading motor assembly ❷ in an arrow direction.

2. Mounting

- 1) Put the pin ❺ of the loading motor assembly ❷ in the hole of the mechanical chassis, and mount it with the screws ❷ and ❸ in that order.
- 2) Mount the connector ❶.
- 3) Mount the LB-12 board.

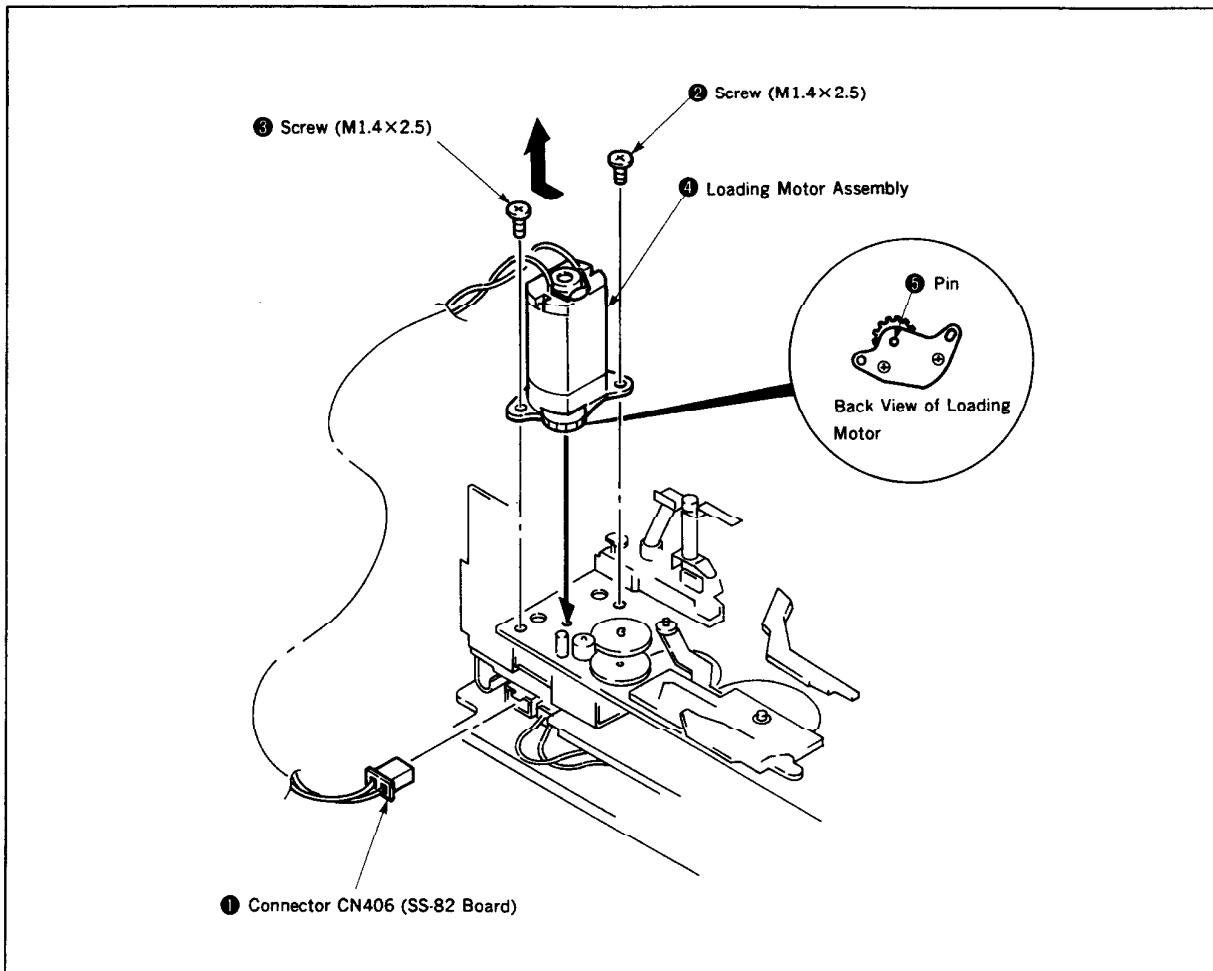


Fig. 38

3-18 GUIDE RAIL BASE 1 ASSEMBLY (Fig. 39)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Unskate the LS chassis a little.
- 3) Remove the two screws ●, and then, guide rail base 1 assembly ●.

Note : Be careful not to lose the spacers inserted in the parts ① and ② of the guide rail base 1 assembly ●. (Fig. B)

2. Mounting

- 1) Apply half a drip each of molyton grease at 2 places on the back of the guide rail base 1 assembly. (Fig. A)
- 2) Put the pin ● of the guide rail base 1 assembly ● in the notch of the chassis, and tighten the two screws ● with a torque of 0.6kg·cm.
- 3) Referring to 1-1, mount the cassette compartment holder assembly.

Note1 : Mount paying attention to the number of spacers inserted and their locations.

Note2 : When tightening the screws, be careful not to bend the TG-2 upper flange ● with a screwdriver bit.

Note3 : Note that the part c of the guide rail base 1 assembly is easily broken. (Fig. B)

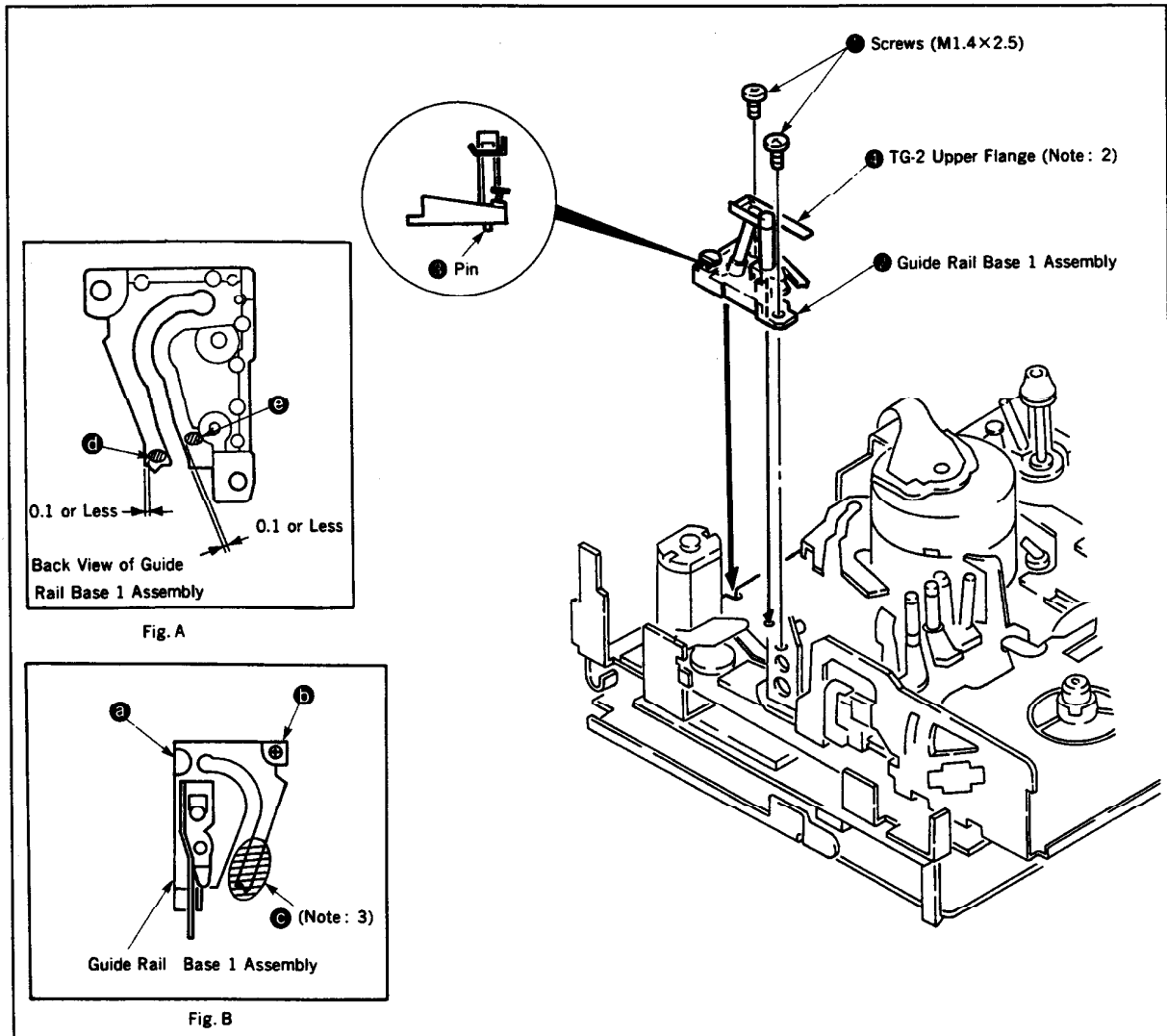


图39.

3-19 GUIDE RAIL BASE 2 ASSEMBLY (Fig. 40)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to the Service Manual, open the board in the back of the mechanical chassis.
- 3) Remove the four screws ●, and then, frame B assembly ● in a direction of the arrow A.
- 4) Unskate the LS chassis a little.
- 5) Remove the two screws ●, and then, guide rail base 2 assembly ● in a direction of the arrow B.

Note : Be careful not to hit the drum with a screwdriver bit because the screws are located closed to a drum lead.

2. Mounting

- 1) Apply half a drip of molyton grease each to 4 places on the back of the guide rail base 2 assembly. (Fig. A)
- 2) As shown in Fig. B, apply the striking parts of the guide rail base 2 assembly ● to the lower drum, and slide in an arrow direction to fit.
- 3) Pushing the part * of the guide rail base 2 assembly ● lightly in a direction of ● (Fig. B), tighten the two screws ● with a torque of 0.8kg·cm.

Note : Note that the part f is easily broken.

- 4) Mount the frame B assembly with the four screws ●.
- 5) Mount the opened board to the back of mechanical chassis.
- 6) Referring to 1-1, mount the cassette compartment holder assembly.

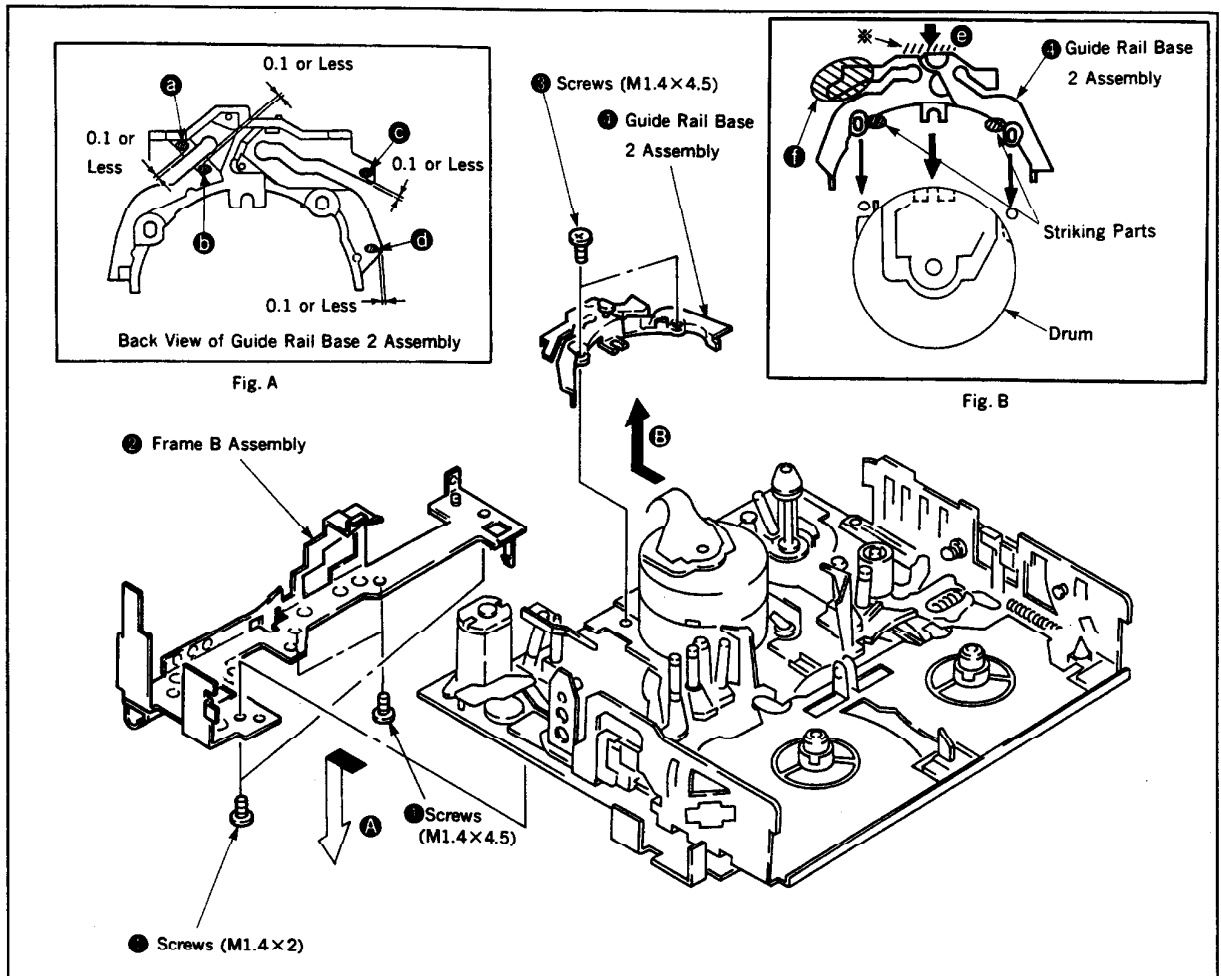


Fig. 40

3-20 GUIDE RAIL BASE 3 ASSEMBLY (Fig. 41)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Remove the flexible rotary shaft ●.
- 3) Remove the two screws ●. Remove the guide rail base 3 assembly ● in an arrow direction, seeing to it that it does not hitch on the capstan housing.

Note : Handle the * marked part carefully because it is easily broken.

2. Mounting

- 1) Apply half a drip of molyton grease each to 2 places on the back of the guide rail base 3 assembly ●. (Fig. A)
- 2) Mount the guide rail base 3 assembly ●, seeing to it that it does not hitch on the capstan housing.
- 3) Tighten the two screws ● with a torque of 0.6kg·cm.
- 4) Mount the flexible rotary shaft ●.
- 5) Referring to 1-1, mount the cassette compartment holder assembly.

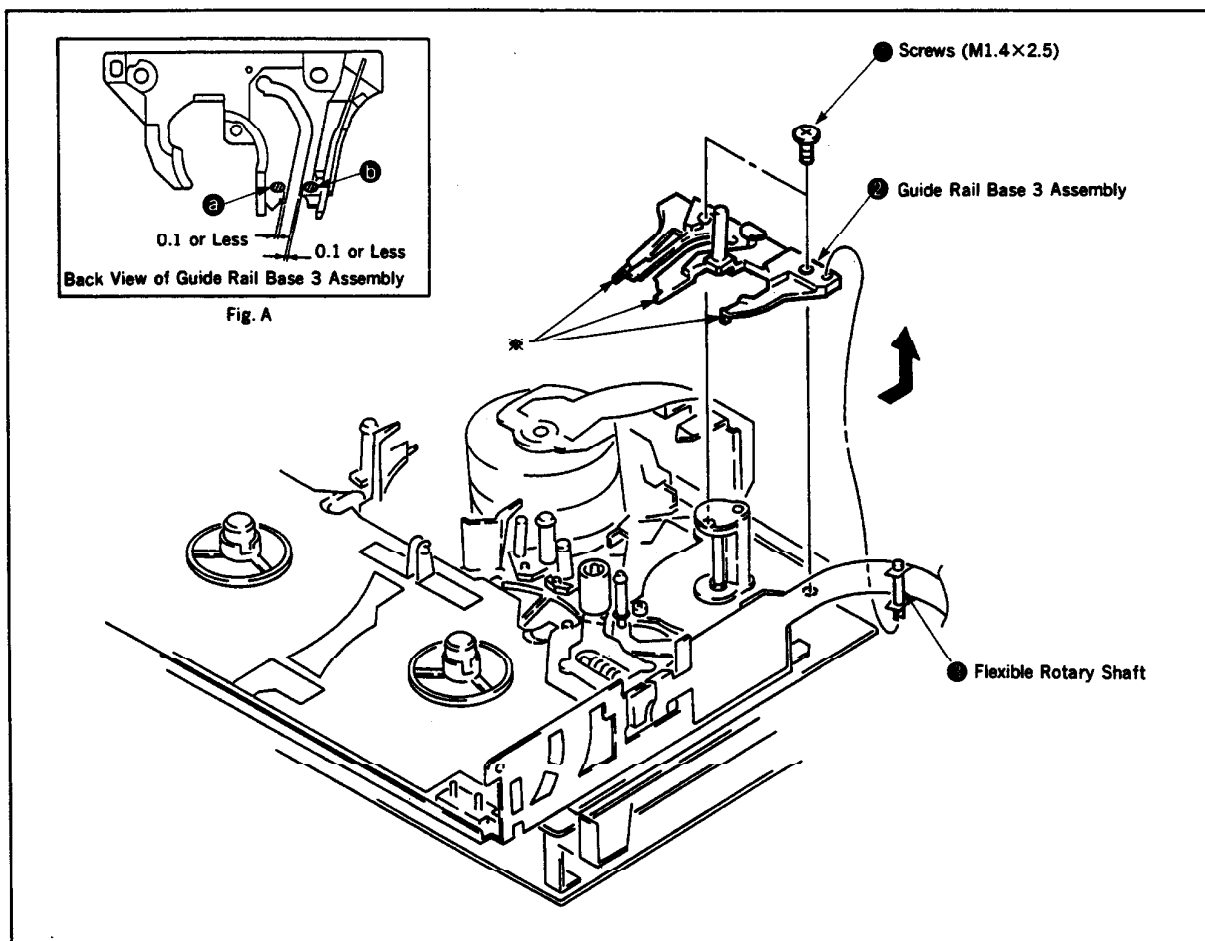


Fig. 41

3-21 CAPSTAN MOTOR ASSEMBLY (Fig. 42)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-20, remove the guide rail base 3 assembly.
- 3) Remove the connector ● of the capstan motor assembly ●.
- 4) Remove the screw ●. Disengaging the gear of the conversion gear assembly ●, remove the capstan motor assembly ● in an arrow direction (obliquely).

2. Mounting

- 1) As shown in Fig. A, incline the capstan motor assembly ● to engage the gear of the capstan motor assembly ● with that of the conversion gear assembly ●, and tighten the screw 3 with a torque of 1kg·cm.
When this is done, be careful not to damage the gear of the conversion gear assembly ●.
- 2) Mount the connector 2 to the capstan motor assembly ●.
- 3) Referring to 3-20, mount the guide rail base 3 assembly.
- 4) Referring to 1-1, mount the cassette compartment holder assembly.

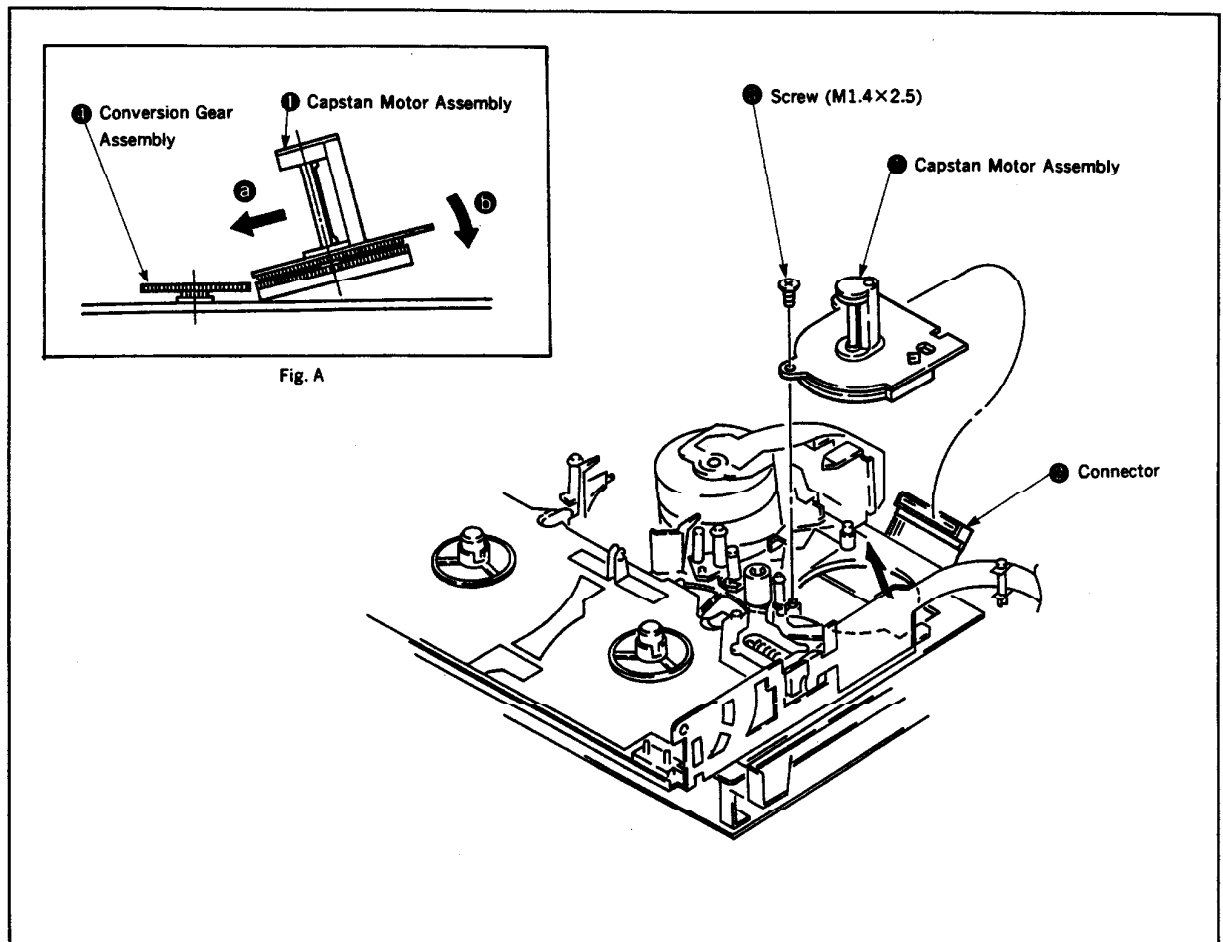


Fig. 42

3-22 DRUM BASE ASSEMBLY (Fig. 42)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Remove the motor flexible board ● from the board.
- 3) Referring to 3-19, remove the guide rail base 2 assembly.
- 4) Remove the two screws ●.
- 5) Draw out the head flexible board ● carefully from the hole of the mechanical chassis not to damage it, and remove the drum base assembly.

2. Mounting

- 1) Put the head flexible board ● in the hole of the mechanical chassis and put the positioning pins ● of the drum base in the holes of the mechanical chassis.
- 2) Tighten the two screws ● with a torque of 0.8kg·cm.
- 3) Referring to 3-19, mount the guide rail base 2 assembly.
- 4) Mount the motor flexible board ● to the board.
- 5) Referring to 1-1, mount the cassette compartment holder assembly.

Note : After mounting, make tape path adjustment in Section 4.

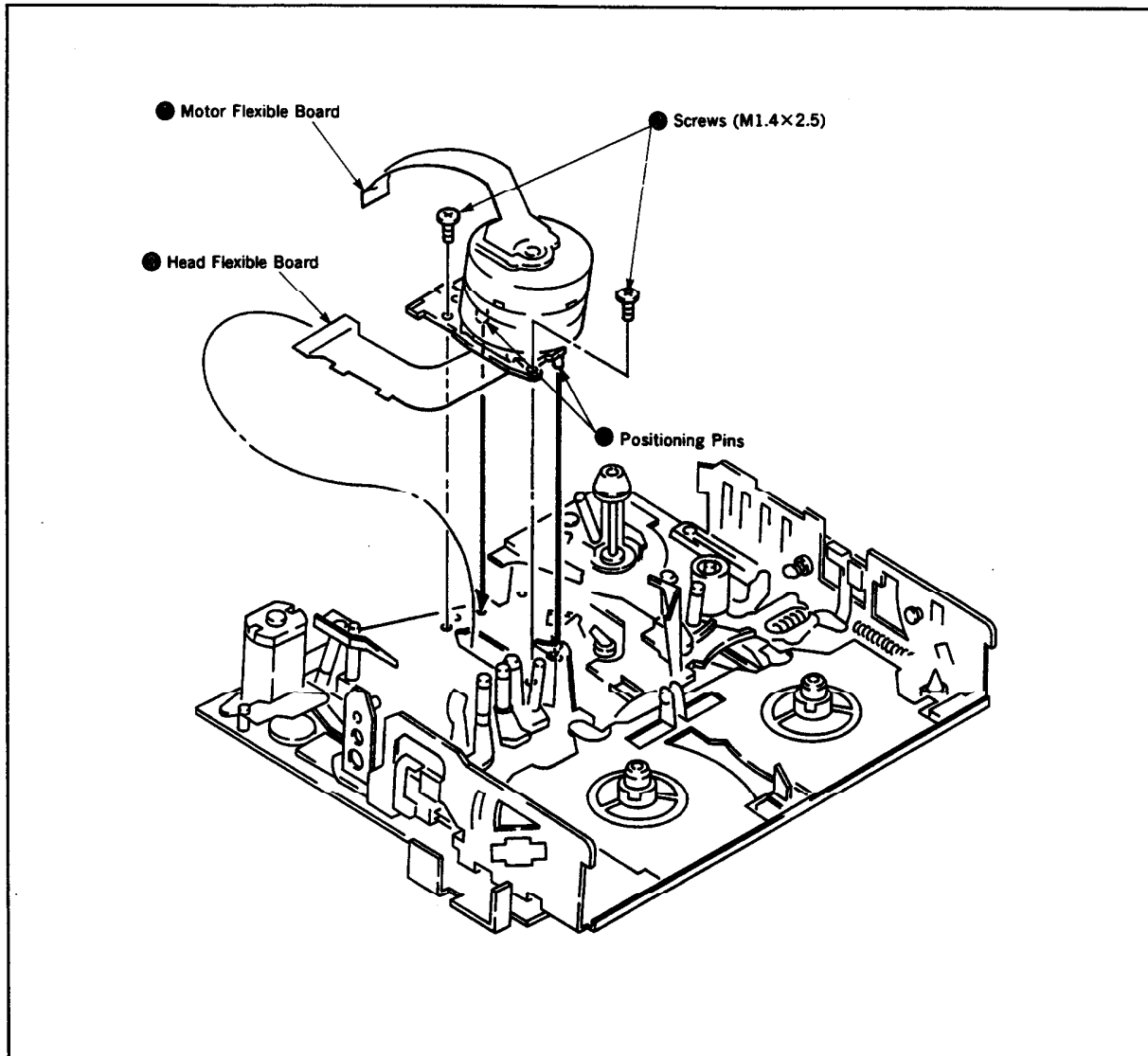


Fig. 42

3-23 DRUM ASSEMBLY (Fig. 43)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Remove the motor flexible board ● from the board.
- 3) Referring to 3-19, remove the guide rail base 2 assembly.
- 4) Remove the three screws ● from the back of the mechanical chassis.
- 5) Draw out the head flexible board ● carefully from the hole of the mechanical chassis not to damage it, and remove the drum assembly ●.

2. Mounting

- 1) Put the head flexible board ● in the hole of the mechanical chassis, and mount it so that the pins ● and ● will be put in the holes ● and ● shown in Fig. A.
- 2) Tighten the three screws ● with a torque of 0.5kg·cm.
- 3) Referring to 3-19, mount the guide rail base 2 assembly.
- 4) Mount the motor flexible board ● to the board.
- 5) Referring to 1-1, mount the cassette compartment holder assembly.

Note : After mounting, make tape path adjustment in Section 4.

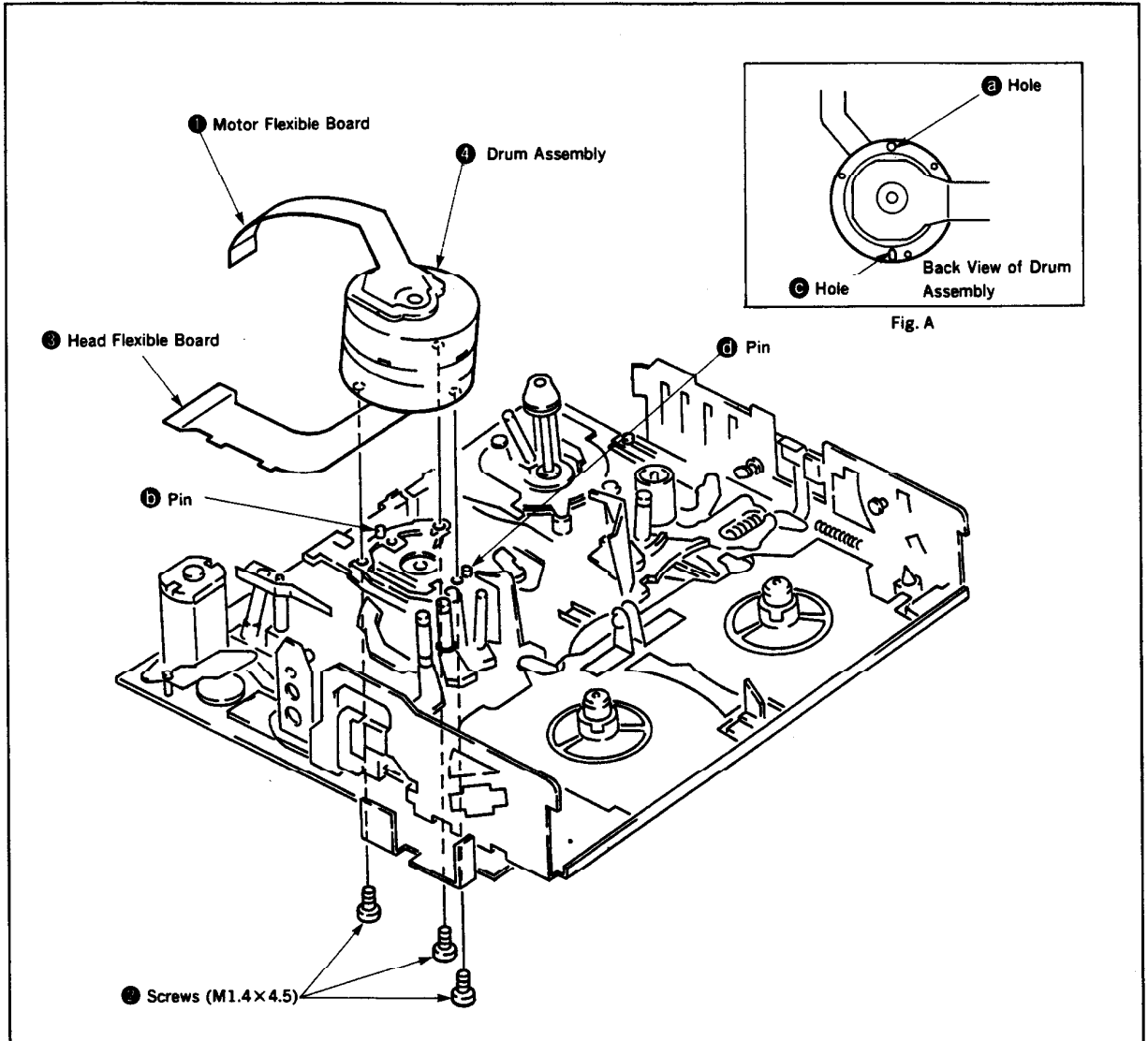


Fig. 43

3-24 Replacement of Rotary Upper Drum Assembly

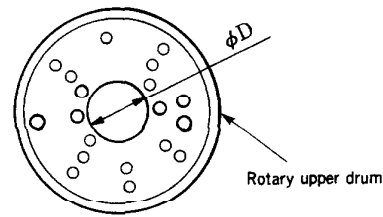
There are two rotary upper drum assembly types, depending on a color mark. (Fig. A in Fig. 45)

NTSC:

A-7049-190-A	Rotary upper drum assembly DGR-32-R-(1)
A-7049-189-A	Rotary upper drum assembly DGR-32-R-(2)

PAL:

A-7049-197-A	Rotary upper drum assembly DGR-37-R-(1)
A-7049-198-A	Rotary upper drum assembly DGR-37-R-(2)



Manufacturing upper drum

RANK	φD	MARK	
A	$\phi 8^{+0.0015}_{+0.001}$	Green	-01
B	$\phi 8^{+0.001}_{+0.0005}$	Green, Brown	
C	$\phi 8^{+0.0005}_0$	Black	
D	$\phi 8^{-0}_{-0.0005}$	Black, Brown	
E	$\phi 8^{-0.0005}_{-0.001}$	Red	-11
F	$\phi 8^{-0.001}_{-0.0015}$	Red, Brown	
G	$\phi 8^{-0.0015}_{-0.002}$	Blue	
H	$\phi 8^{-0.002}_{-0.0025}$	Blue, Brown	

Repairing upper drum

SUFFIX	φD	REMARKS	DRUM UPPER
-01	$\phi 8^{+0.001}_{+0.0005}$	Green, Brown	NTSC DGR-32-R-(1)
	$\phi 8^{+0.0005}_0$	Black	PAL DGR-37-R-(1)
-11	$\phi 8^{-0.001}_{-0.0015}$	Red, Brown	NTSC DGR-32-R-(2)
	$\phi 8^{-0.0015}_{-0.002}$	Blue	PAL DGR-37-R-(2)

1. Removal

- Referring to 3-23, remove the drum assembly.
- Remove the two screws ❶. (Fig. 44)
- Hold the outlet (base) of the guide protector ❷, lift it up obliquely. In that state, hold the outer figure of the back yoke ❸ and remove it. (Fig. 44)

Note: Note that the flexible board and guide protector ❷ easily come off position because they are only pasted.

- As shown in Fig. A, set the rotor earth spring ❹ around spring hook. (Fig. 44)
- Using a drum screwdriver (Ref. No. J-11), remove the two hexagon socket bolts ❺, and then, rotary upper drum assembly ❻. (Fig. 45)
- Using the drum screwdriver (Ref. No. J-11), remove the two hexagon socket bolts ❻, and then, rotor ❼. (Fig. A in Fig. 45)

2. Mounting

- Clean the flange surface ❶ and the surface of the rotary upper drum assembly ❷ which comes into contact with it, and make sure that there is no dust or scratch. (Fig. 45)
- Adjust a direction of the upper drum so that the head contact mold pin ❸ will be put in the reference hole of the rotary upper drum assembly ❷, and push it in lightly. (Fig. 45)

Note: Check visually that the clearance between the upper and lower drums is about 0.05mm.

- Using the drum screwdriver (Ref. No. J-11), tighten the two hexagon socket bolts ❺ (800g·cm) and rotate it with finger to make sure that there is no abnormality. (Fig. 45)
- Put the pin ❸ of the rotor ❼ in the hole of the rotary upper drum assembly. Using the drum screwdriver (Ref. No. J-11), tighten the hexagon socket bolts ❻. (800g·cm) (Fig. A in Fig. 45)
- Remove the rotor earth spring ❹ from the spring hook. Using tweezers, etc., hook it onto the groove of the stator boss ❶. (Fig. B in Fig. 45)

Note: See to it that the rotor earth spring ❹ is not located in the gap between the flange and stator.

- Hold the outer figure of the back yoke ❸, put it on the inner step of the upper drum and insert the other side slowly. (Fig. B in Fig. 44)
- Tighten the two screws ❶. (500g·cm) (Fig. 44)
- Rotate the upper drum with finger to check that it runs smoothly.
- Referring to 3-23, mount the drum assembly.

Note: After mounting, be sure to make tape path adjustment in Section 4.

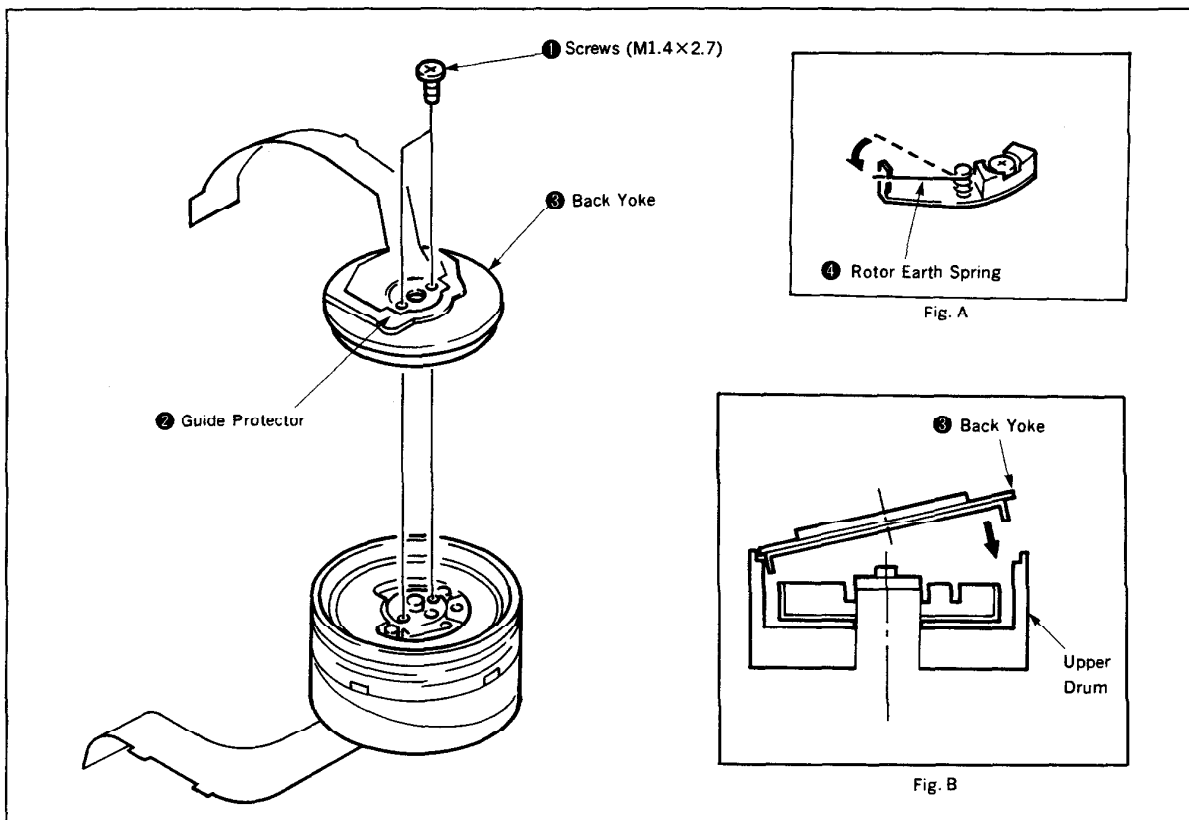


Fig. 44

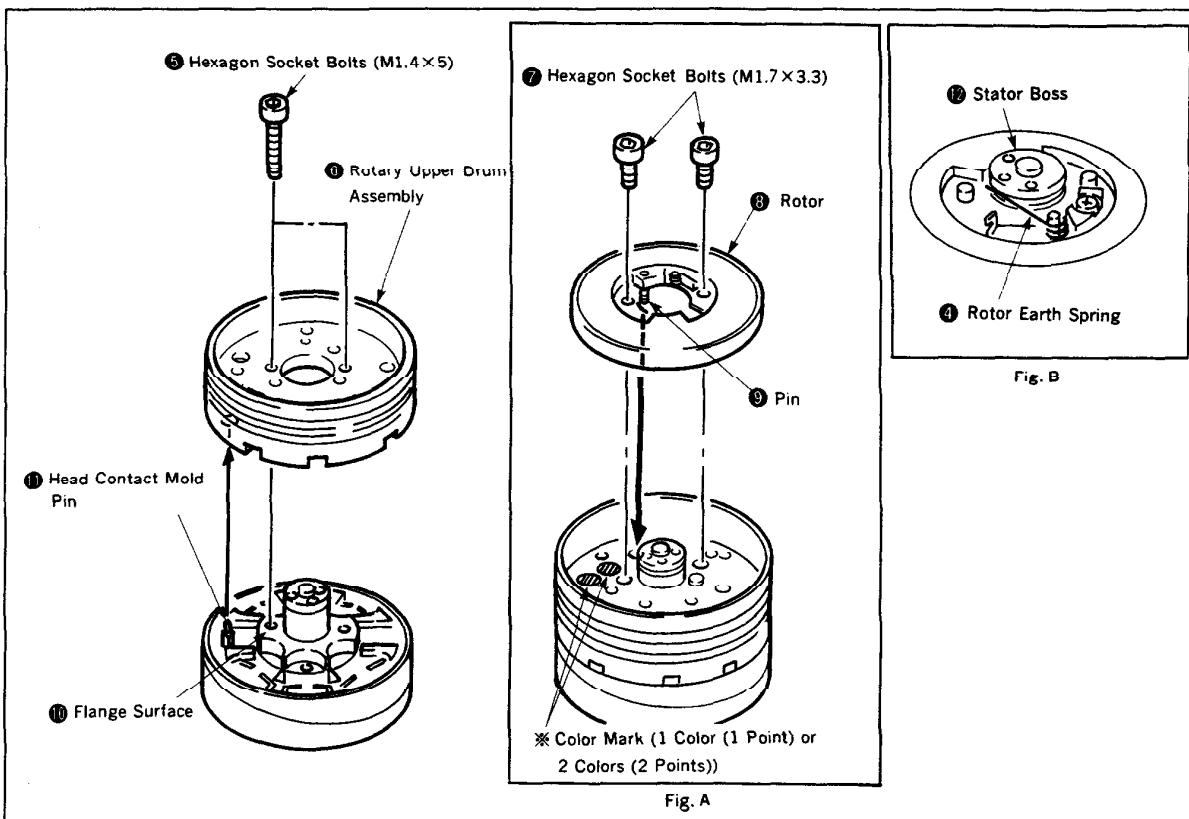


Fig. 45

3-25 REEL TABLE HEIGHT CHECK (Fig. 46)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder assembly.
- 2) Referring to 3-1, remove the LED base.

2. Check

- 1) Using slide calipers, etc., check that distances from the LS chassis to the S reel table reel resting surface ② and T reel table reel resting surface ③ are respectively as shown in below.

3. Mounting

- 1) Referring to 3-1, mount the LED base.
- 2) Referring to 1-1, mount the cassette compartment holder assembly.

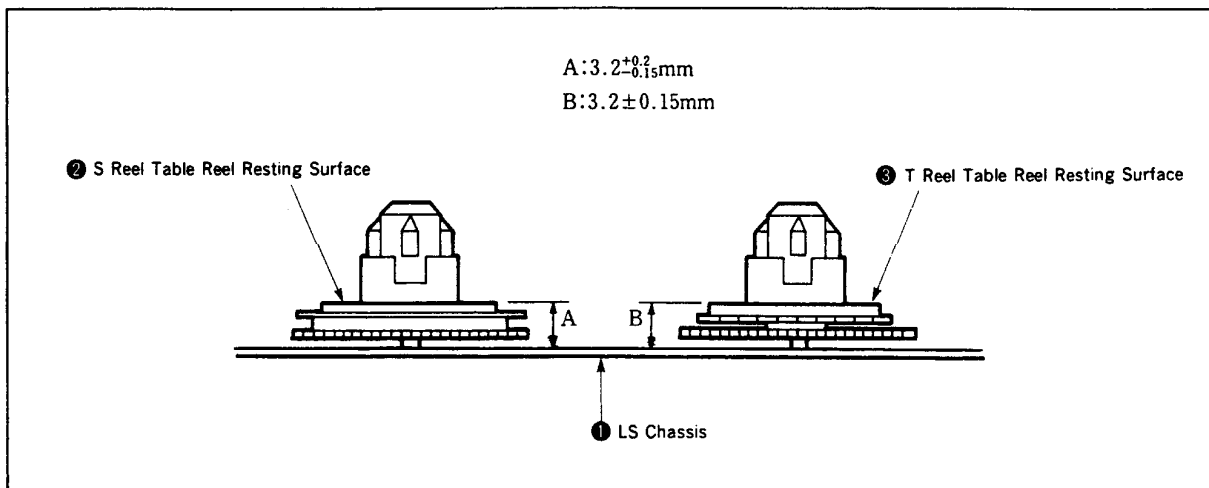


Fig. 46

3-26 FWD/RVS TORQUE CHECK

- 1) Set the FWD/RVS take-up torque cassette (Ref No J-10)
- 2) In the FWD mode, check that a T reel torque value is $5 - 15 \text{g} \cdot \text{cm}$.
- 3) Turn on the REC/REVIEW button and check that an S reel torque value is $25 \text{g} \cdot \text{cm} - 45 \text{g} \cdot \text{cm}$.
- 4) When the values above are not met, replace the respective reel tables.

3-27 TENSION REGULATOR POSITION ADJUSTMENT

1. Removal

- 1) Referring to 1-1, remove the cassette compartment holder.

2. Adjustment

- 1) Set a cassette tape, select the **REC** mode and run the tape. (Refer to 1-3)
- 2) With the tape running, check that the distance between TG-1 and TG-2 is 9.35 – 10.7mm. (Fig. 47)
- 3) When they are not at specified positions, remove the cassette and go through the steps 4) on.
- 4) Referring to 3-1, remove the LED base.
- 5) Loosen the screw ❶

- 6) When TG-1 is located inside (or outside) its specified position, shift the TG-1 adjustment block 2 slightly in a direction of the arrow **A** (or **B**) and fix with the screw ❶. (Fig. 48)

- 7) Referring to 3-1, mount the LED base.

Note : Use the cassette tape after feeding the tape as far as a middle point.

When taking the steps 4) and 5), remove the cassette tape first.

Check that TG1 is able to move in direction C during REC.

3. Mounting

- 1) Referring to 1-1, mount the cassette compartment holder assembly.

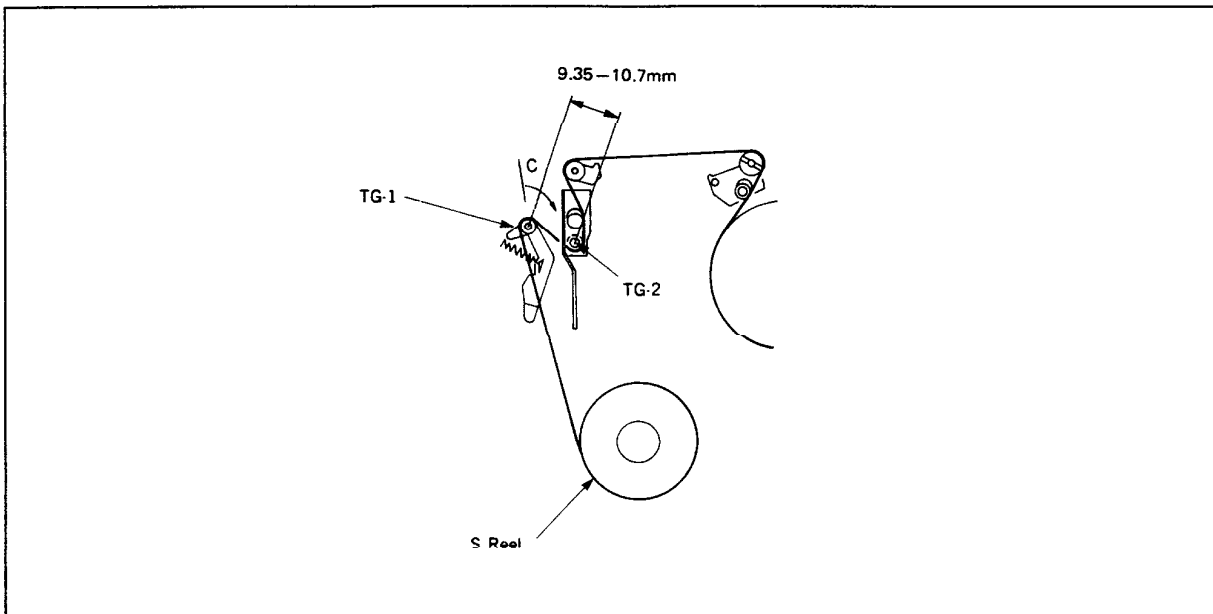


Fig. 47

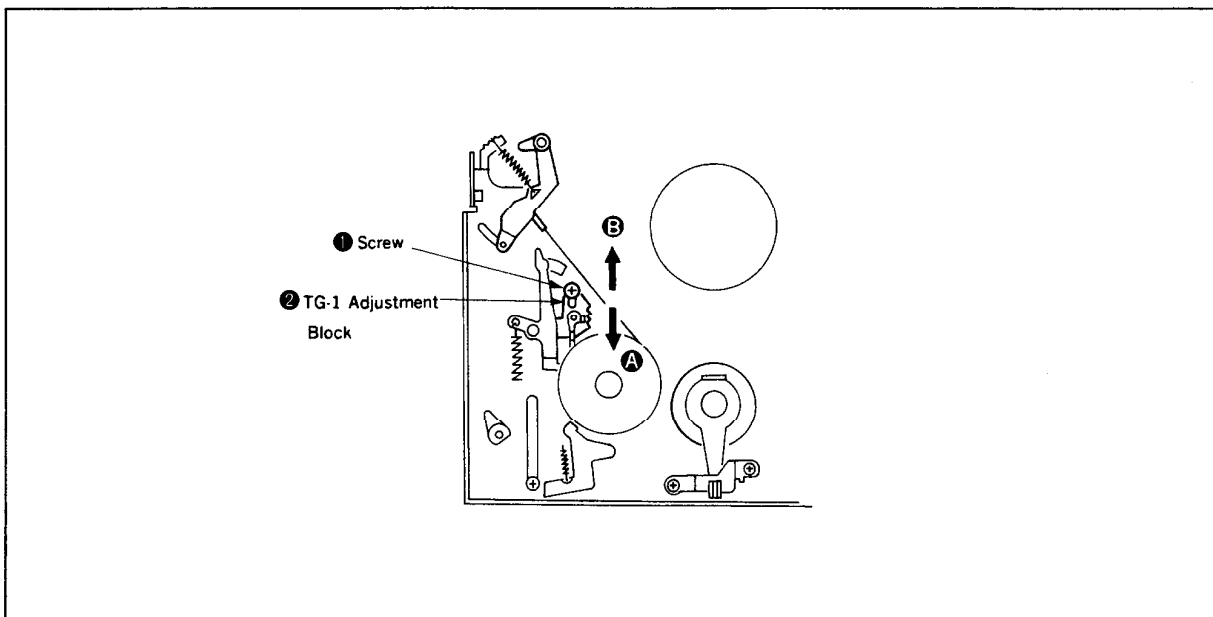


Fig. 48

3-28 FWD BACK TENSION ADJUSTMENT (Fig. 49)

1. Removal

- 1) Referring to 1-1, remove the cassette compartment assembly.
- 2) Referring to 3-7, remove the LED base.

2. Adjustment

- 1) Select the **REC** mode.
- 2) Set the tension measurement reel (Ref. No. J-8)●.
- 3) Using the dial tension gauge (Ref. No. J-7)●, measure a tape tension at the outlet of TG-2. When this is done, pull the tape at a rate of 14mm/sec.
- 4) Change the position of the tension regulator spring ● position as shown in Fig. A so that measure center value of the tension is 4–6.5g.

Note : When this is done, see to it that the gear ● is not engaged with the S reel table.

3. Mounting

- 1) Referring to 1-1, mount the cassette compartment holder assembly.
- 2) Referring to 3-1, mount the LED base.

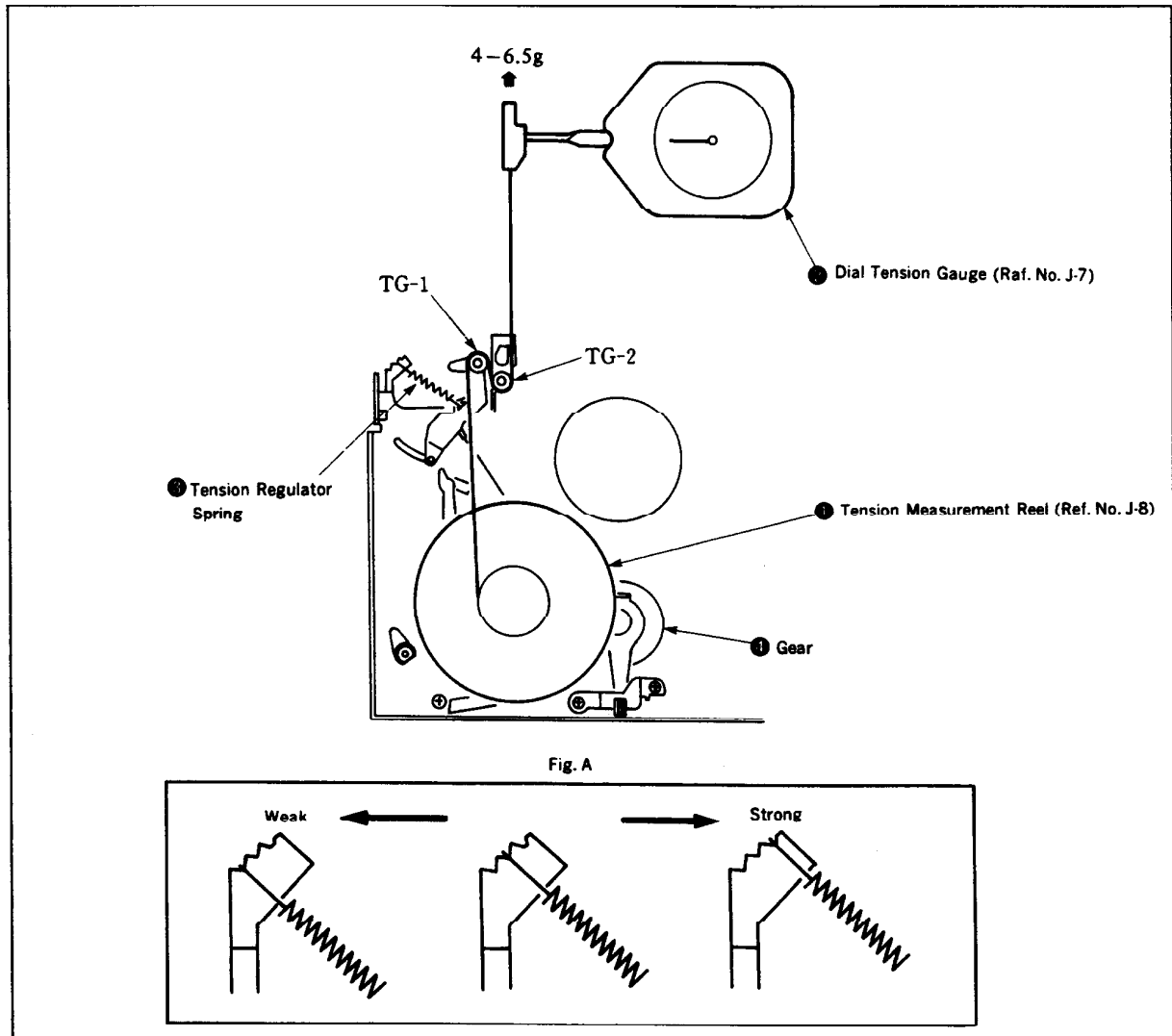


Fig. 49

4. TAPE PATH ADJUSTMENT

The 8mm video system uses ATF (Automatic Track Finding) which instantaneously controls a tape running speed based on 4 types of pilot signals and performs high-precision tracking.

This does away a tracking control knob and allows accurate track tracing.

On the other hand, however, the ATF system has a problem in adjusting the tape path system. That is, if head tracing is out of order a little, the ATF system automatically corrects it, which means that perfect adjustment cannot be done.

To avoid this problem, a track shift jig had been used to adjust the tape path system. In the FL (Q) mechanism, the ATF system is forcibly operated to shift a tracking amount constantly (approx. 1/4) by setting the PATH mode. So, fine tracking adjustment can be easily done.

No track shift jig is required any more.

Example) For CCD-V11/V88
CN404

4	GND
3	CAM ADJ
2	TEST
1	PATH

The path mode is set by shorting the pins ① and ④.

4-1 PREPARATION FOR ADJUSTMENT

- 1) Clean the tape running surfaces (tape guides, drum, capstan shaft, pinch roller). (Fig. 51)
- 2) Set the PATH mode by shorting the TEST pins (CN404 pins ① and ④ for CCD-V11/V88).
- 3) Connect to an oscilloscope.
- 4) Play back a tracking alignment tape (NTSC: WR5-1N), (PAL: WR5-1C).
- 5) Check that a RF waveform is flat at the inlet and outlet of the oscilloscope. (Fig. 50 ③)

When it is not flat, make adjustment in accordance with the procedures below.

When the RF waveform is not flat at the inlet/outlet ; (Fig.50 ② and ③)

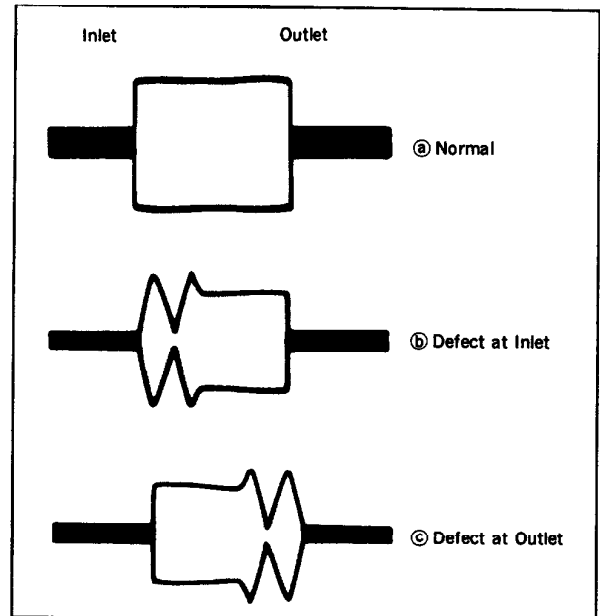


Fig. 50

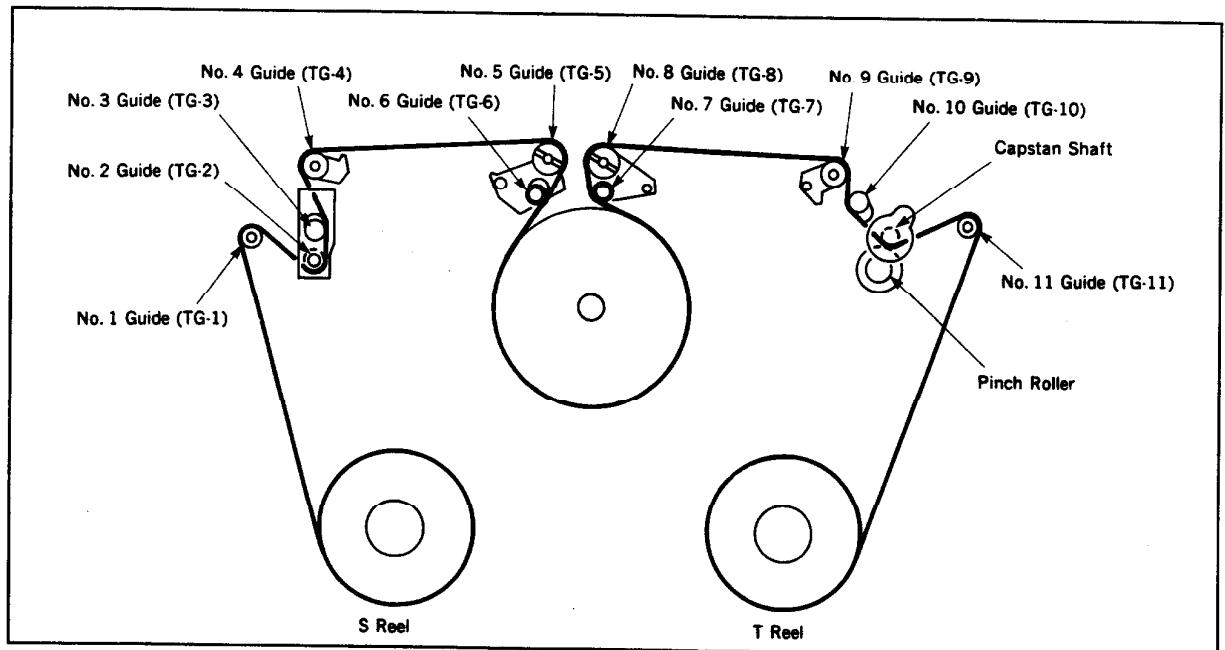


Fig. 51 Tape Guides Location

4-2 TRACKING ADJUSTMENT (Fig. 52)

- 1) Play back the tracking alignment tape.
- 2) Loosen the No. 5 guide (TG-5) lock screw ① and turn the No. 5 guide to flatten the waveform at the inlet.
- 3) Tighten the No. 5 guide (TG-5) lock screw ① to lock the No. 5 guide.
- 4) Loosen the No. 8 guide (TG-8) lock screw ② and turn the No. 8 guide to flatten the waveform at the outlet.
- 5) Tighten the No. 8 guide (TG-8) lock screw ② to lock the No. 8 guide. When this is done, make sure that the waveform does not change at the outlet.

Note : Be careful not to loosen the lock screw too much because the guide is easily moved.

Tape path Adjustment for "Guide Rail Base 2 with TG8 Gate Adjustment"

You do not have to adjust the TG-8 gate adjustment screw.

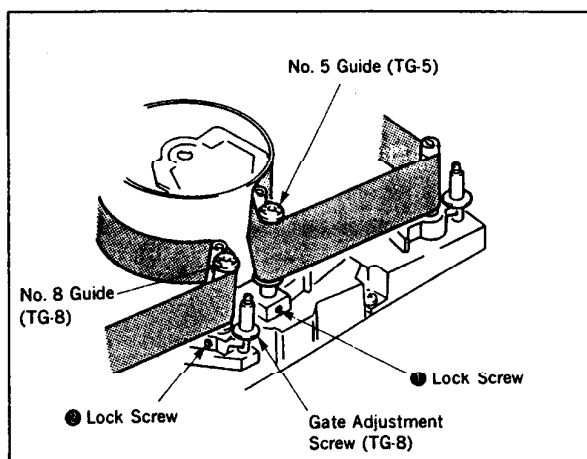


Fig. 52

4-3 NO. 4 GUIDE (TG-4) ADJUSTMENT

When an entire guide base is replaced, its height has been preste.

TG-4 Guide Height Presetting

- 1) With the top surface of the TG-4 guide leveled, rotate an upper flange by one turn. This is a preset height.

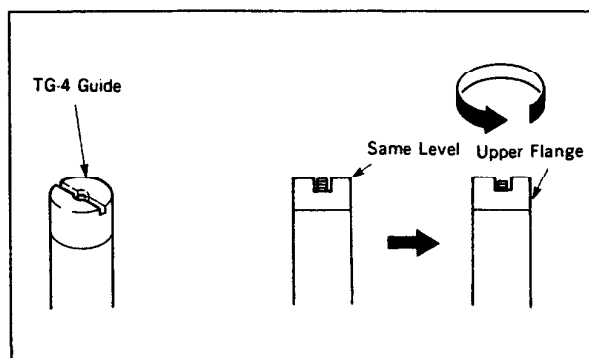


Fig. 53

No. 4 Guide (TG-4) Adjustment

- 1) Play back the tracking alignment tape.
- 2) In the FWD mode, check that the tape runs along a TG-4 lower flange. When there is a clearance, turn TG-4 counter-clockwise to put the tape along the TG-4 lower flange. turning angle must be within 180°.

When this is done, check that a tracking waveform (Fig. 54) is not changed.

When a tracking waveform inlet is downward as shown in Fig. 55, make tracking adjustment at the inlet side by raising a height of TG-4.

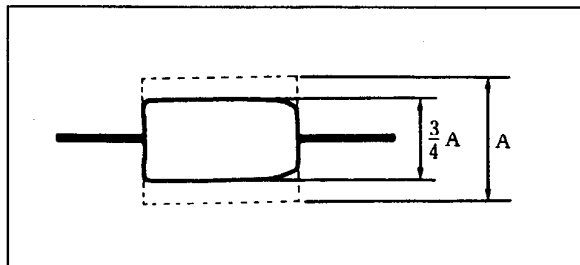


Fig. 54

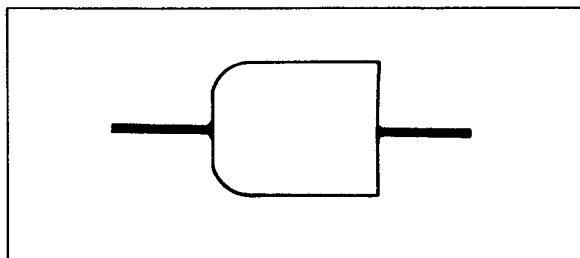


Fig. 55

Tape Path Adjustment for "Guide Rail Base 1 with TG4 Gate Adjustment" (Fig. 56)

After adjusting an inlet, when the TG-4 lower flange is curled in the REV mode, turn the TG-4 gate adjusting screw at pitches of 45° to the left to remove a curl. (A lock screw is attached to the TG-4 gate adjusting screw. First, loosen the lock screw a little, and then, turn the gate adjusting screw. After adjustment, tighten the lock screw.)

If the TG-4 gate adjusting screw is turned to the left too much, the TG-2 upper flange (arrow-indicated part in the figure above) is greatly curled. If it happens, turn the screw to the right.

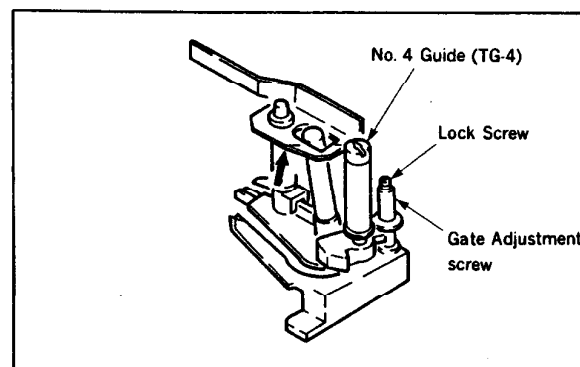


Fig. 56

4-4 NO. 11 GUIDE (TG-11) ADJUSTMENT

- 1) In the PLAY BACK mode, check that it has no deflection between the capstan and No. 11 guide (TG-11).
(Criterion: 0.5mm or less)
when the tape is deflected, turn the No. 11 guide (TG-11) to remove its deflection. (Fig. 57)
- 2) Select the REV mode and check the RF waveform at the outlet side. (Fig. 58)
- 3) If the waveform is defective, turn the TG-11 nut counterclockwise by 90° and recheck 2), 3) and 4).
- 4) Apply screw lock to the No. 11 guide (TG-11).

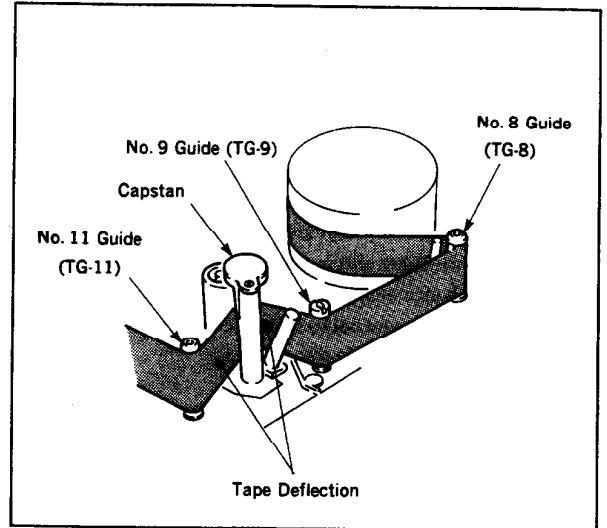


Fig. 57

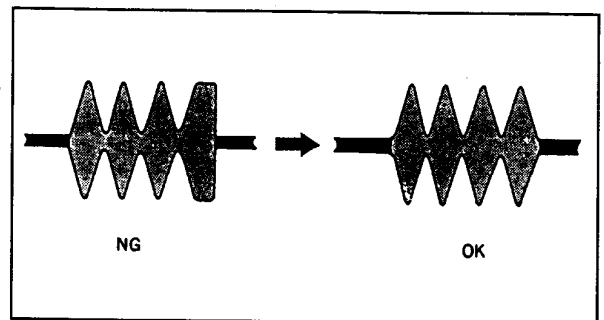


Fig. 58

4-5 CHECK AFTER ADJUSTMENT

1. Tracking Check

- 1) Play back the tracking alignment tape. In the PATH mode, shift a track. (Fig. 59)
- 2) At this time, check that a minimum amplitude value (E_{MIN}) is 67% or more of a maximum amplitude value (E_{MAX}). (Fig. 60)
- 3) Make sure that the waveform does not fluctuate greatly. (Fig. 61)

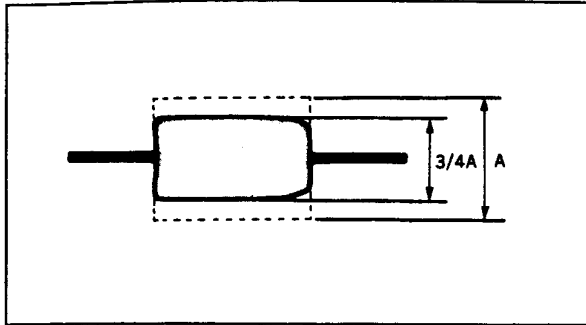


Fig. 59

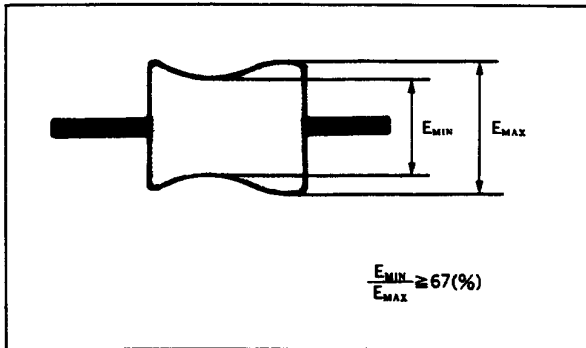


Fig. 60

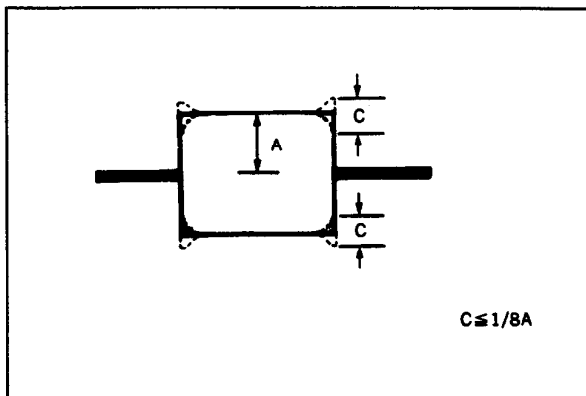


Fig. 61

2. CUE, REV Check

- 1) Play back the tracking alignment tape and select the **REV** mode. At this time, waveform peak pitches must be uniform. (Fig. 62 (a)) When they not uniform, make tracking adjustment in 4-2 and No. 11 guide (TG-11) adjustment in 4-4.
- 2) Select the **CUE** mode. At this time waveform peak pitches must be uniform. (Fig. 62 (b)) When not uniform, make tracking adjustment in 4-2.

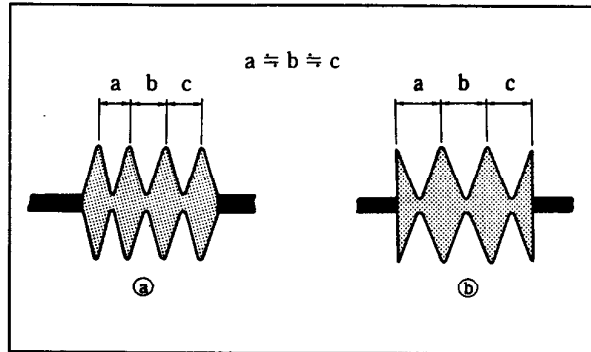


Fig. 62

3. Rise Check

- 1) Play back the tracking alignment tape.
- 2) In the PLAY BACK mode, check that the RF waveform rises horizontally within one second. At this time, check also that the tape is not deflected around the pinch roller. (Fig. 63)
- 3) Play back the tape after CUE/REV and FF/REW operation and check that the RF waveform rises horizontally within one second. At this time, check also that the tape is not deflected around the pinch roller.
- 4) Repeat the checks in 2) and 3).

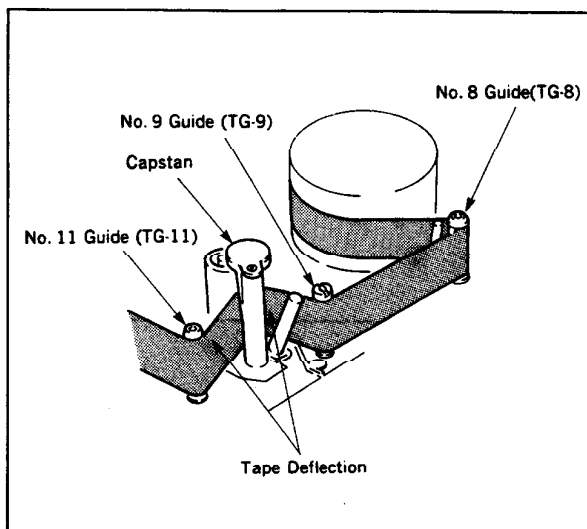


Fig. 63

4. Tape Running Check

In the **CUE** and **REV** modes, check that the TG-2 upper and lower flanges, TG-4 lower flange, TG-5 upper flange, TG-8 upper flange and TG-11 upper and lower flanges are not cued greatly. (Fig. 63)

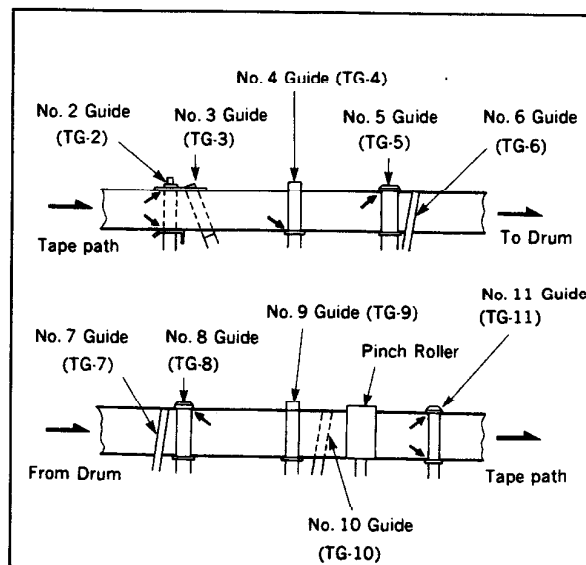
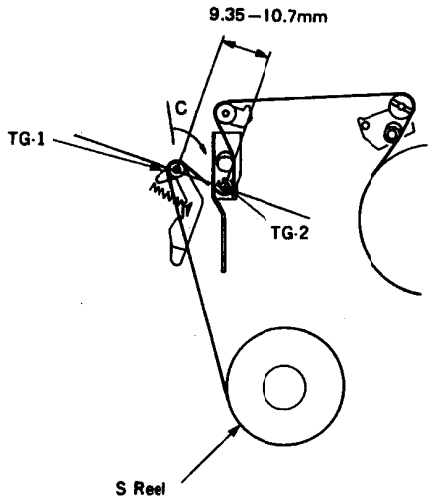
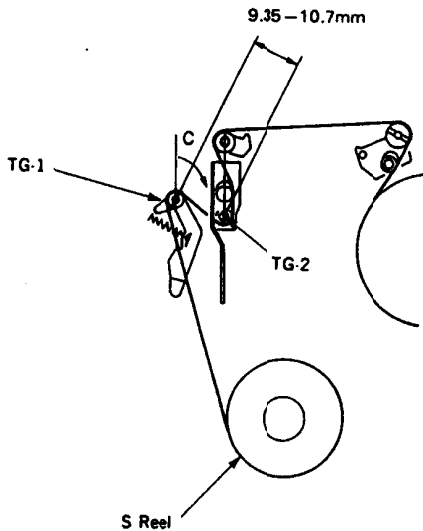


Fig. 64

8mm Video MECHANICAL ADJUSTMENT MANUAL II

Correction Table

As there is an error on page 40, please correct it.

Incorrect	Correct
 The diagram shows the mechanical adjustment of an 8mm video camera. It includes labels for TG-1, TG-2, C, and S Reel. A dimension line indicates a distance of 9.35-10.7mm. The diagram is labeled 'Incorrect'.	 The diagram shows the mechanical adjustment of an 8mm video camera. It includes labels for TG-1, TG-2, C, and S Reel. A dimension line indicates a distance of 9.35-10.7mm. The diagram is labeled 'Correct'.

CCD-TR81/TR705

RMT-504

SONY[®] SERVICE MANUAL

US Model
Canadian Model

CCD-TR81

E Model

CCD-TR705

SUPPLEMENT-1

File this supplement-1 with the service manual.

- BLOCK DIAGRAMS
- ADJUSTMENTS

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1-4. CAMERA SYSTEM CONTROL TERMINAL DESCRIPTION VC-87 BOARD IC261 (MC68HC11L6FU)

Pin No.	Signal Name	I/O	Function
1	DISCHG	O	AWB, AE integrating A/D reset pulse, V period "H" pulse
2	B SELECT	O	AWB measuring line select pulse (blue)
3	G SELECT	O	AWB measuring line select pulse (green)
4	R SELECT	O	AWB measuring line select pulse (red)
5	TG STB	O	Strobe signal to timing generator Camera mode ... V period "High" pulse. In VTR mode, this output becomes "Low".
6	D/A LD 1	O	Data load command to EVR (IC255), V period "High" pulse
7	D/A LD 0	O	Data load command to EVR (IC204,205), V period "High" pulse
8	AD EN	O	Titler 1-bit A/D converter operation ON/OFF output. Normally "High". When MODE button is pushed, this becomes 7V period "Low" pulse.
9	N.C		
10	N.C		
11	N.C		
12	M FOCUS LED	O	Manual focus sensor ON/OFF control. In manual focus mode, this output becomes "Low".
13	N.C		
14	HALL SENS	I	Hall element voltage input (analog input)
15	ZOOM POS 1	I	Zoom position detection voltage input (analog input)
16	ZOOM POS 2	I	Zoom position detection voltage input (analog input)
17	ZOOM KEY	I	Zoom switch voltage input (analog input)
18	N.C		
19	AF A/D	I	AF evaluation value detection input (analog input).
20	AGC CONT	I	AGC voltage input (analog input)
21	A/D REF (-)	-	Built-in A/D converter lower limit reference voltage (analog input)
22	A/D REF (+)	-	Built-in A/D converter upper limit reference voltage (analog input)
23	A VDD	-	SS 5V
24	VSS	-	GND
25	MODE B	-	Pull-up to EVER 5V
26	N.C		
27	N.C		
28	N.C		
29	N.C		
30	EXTAL	I	Clock oscillation
31	XTAL	O	
32	VDD	-	SS 5V
33	D/A LD 2	O	Data load command to 12-bit D/A converter (IC256), V period "High" pulse
34	JCS	O	Used for external indicator jig data latch, V period "High" pulse
35	SD CS	O	Sine wave driver chip select signal
36	SD RESET	O	Sine wave driver reset signal
37	SG STB	O	Sync generator data latch pulse
38	FOC END FAR	I	Focus lens initial position read
39	ZOOM T	O	Zoom motor telephotographic direction rotation designation
40	ZOOM W	O	Zoom motor wide angle direction rotation designation
41	N.C		
42	N.C		
43	N.C		
44	N.C		

Pin No.	Signal Name	I/O	Function
45	RESET	-	Reset.
46	XIRQ	I	Pull-up to SS 5V
47	IRQ	I	Pull-up to SS 5V
48	LANC IN	I	LANC input
49	VSS	-	GND
50	LANC OUT	O	LANC output
51	CAM SI	I	Serial data input from servo/system control
52	CAM SO	O	Serial data input to servo/system control and slave
53	SCK	O	Serial clock to servo/system control and slave
54	FOC END LED	O	Focus end LED drive
55	VDD	-	SS 5V
56	FG	I	Focus ring rotational speed input (PWM method)
57	CCD DET	O	CCD DET switch changeover
58	FA/FH	O	AF detection frequency range changeover. FA : 400kHz~ ; FH : 1MHz~.
59	PH RESET	O	Peak hold IC (IC733) Reset
60	MAN IRIS	O	IRIS system AUTO/MANUAL changeover
61	CAM CS	I	Chip select signal from servo/system control
62	AW IN	I	Comparator input of integrating A/D converter for auto white balance
63	DIR	I	Focus ring rotation direction input
64	VSS	-	GND



1-9. SERVO, SYSTEM CONTROL TERMINAL DESCRIPTION VS-76 BOARD IC601 (CXP80624)

Pin No.	Signal Name	I/O	Function										
1	CAP ON	O	Capstan driver ON control signal										
2	CAP FWD/RVS	O	Capstan rotation direction control signal. "High": FWD; "Low": RVS.										
3	RP PB	O	REC/PB mode changeover signal for REC/PB amplifier (VS-76 board IC001,002), ATF IC										
4	FE ON	O	Flying erase oscillation ON/OFF signal. "Low": Oscillation ON.										
5	JOG VD	O	Quasi VD output to be inserted into video signal when variable speed playback is executed.										
6	JOG	O	Normal/JOG mode changeover signal. "High": JOG mode.										
7	CAM RESET	O	Camera microcomputer reset signal										
8	CAM/LINE	O	Camera/line changeover output. "High": Camera mode; "Low": VTR mode.										
9	VTR DD ON	O	DC-DC converter (VTR system) control signal										
10	CAM DD ON	O	DC-DC converter (camera system) control signal										
11	CAM CS (O)	O	Chip select signal for communications between camera and microcomputer										
12	MODE SW C	I											
13	MODE SW B	I	Mechanical position input (MODE switch)										
14	MODE SW A	I											
15	START/ STOP SW	I	START/STOP switch input (microcomputer standby release input)										
16	EJECT SW	I	EJECT switch input (microcomputer standby release input)										
17	CAM POWER SW	I	CAMERA POWER switch input (microcomputer standby release input)										
18	VTR POWER SW	I	VTR POWER switch input (microcomputer standby release input)										
19	CC LOCK SW	I	CASSETTE IN switch input. "Low": Cassette IN.										
20	LANC POWER ON	I	Input to turn this unit ON with LANC (microcomputer standby release input)										
21	DEW DET	I	Condensation sensor input. "Low": Condensing.										
22	LM LIM ON	I	Loading motor current limiter operation detection signal										
23	SRAM CS	O	Chip select signal to SRAM (TI-34 board IC801)										
24	VIDEO CS	O	Chip select signal to video IC (VC-87 board IC401)										
25	CRTC STB	O	Strobe signal for character generator (TI-34 board IC802)										
26	AUDIO MUTE	O	Audio mute signal to AFM IC (AU-101 board IC801, IC802)										
27	TITLER CS	O	Chip select signal to digital titler (TI-34 board IC803)										
28	LCD CS	O	Chip select signal to LCD microcomputer (VS-76 board IC602)										
29	VTR DA LD	O	Data load signal to EVR (VS-76 board IC302)										
30	N.C												
31	UNLOAD	O	Loading motor control signal <table><tr><td></td><td>OFF</td><td>LOADING</td><td>UNLOADING</td><td>BRAKE</td></tr><tr><td>LOAD</td><td>Low</td><td>High</td><td>Low</td><td>High</td></tr></table>		OFF	LOADING	UNLOADING	BRAKE	LOAD	Low	High	Low	High
	OFF	LOADING	UNLOADING	BRAKE									
LOAD	Low	High	Low	High									
32	LOAD	O	<table><tr><td>UNLOAD</td><td>Low</td><td>Low</td><td>High</td><td>High</td></tr></table> (The microcomputer terminal is N-ch open drain.)	UNLOAD	Low	Low	High	High					
UNLOAD	Low	Low	High	High									
33	LM LIM CONT	O	Loading motor driver current limiter control signal (N-ch Open Drain)										
34	DRUM ON	O	Drum motor drive control signal Z: Motor ON (N-ch Open Drain)										

Pin No.	Signal Name	I/O	Function
35	DRUM FWD/ RVS	O	Drum rotation direction control signal. "Low": RVS; "High": FWD (N-ch open drain).
36	EDIT	O	EDIT ON/OFF control signal. "Low": EDIT, interlocked with EDIT key (N-ch open drain).
37	TALLY LED	O	External TALLY LED/EVF internal TALLY drive LED illumination. When the LED is illuminated, this output becomes "Low" (N-ch open drain).
38	REEL HALL CONT	O	Reel sensor control signal. "Low": Sensor ON (N-ch open drain).
39	MP	I	Microprocessor mode select pin, not selected in this unit.
40	SS RESET	I	Reset pin
41	VSS	-	GND
42	XTAL	O	Clock oscillation (The clock is supplied to ATF IC from this unit.)
43	EXTAL	I	
44	CAM CS (I)	I	Automatic transfer control circuit for communications with camera microcomputer
45	CAM SO	I	Serial data input from camera microcomputer
46	CAM SI	O	Serial data output to camera microcomputer
47	CAM SCK	I	Serial clock input from camera microcomputer
48	KEY 3 AD	I	A/D input for key read, CF block (camera system function)
49	KEY 2 AD	I	
50	KEY 1 AD	I	A/D input for key read, FK block (VTR system function)
51	KEY 0 AD	I	
52	AVSS	-	A/D converter GND
53	AVREF	-	A/D converter reference voltage
54	AVDD	-	A/D converter power
55	HH SENSE	I	Not used (connected to VDD)
56	TAPE END	I	Tape end sensor input. "High": Tape end.
57	TAPE TOP	I	Tape top sensor input. "High": Tape top.
58	PATH MODE	I	Tape path adjustment mode input pin. Normally "High". When adjustment is made, this input becomes "Low".
59	BATT SENSE	I	Battery end/pre end voltage input. A/D input pin.
60	ATF ERROR	I	ATF error (ATF LOCK error) input. A/D input pin.
61	S REEL	I	Supply side reel sensor input. A/D input pin.
62	T REEL	I	Takeup side reel sensor input. A/D input pin.
63	ME/MP SW	I	ME/MP tape discrimination input. "High": ME tape.
64	REC PROOF SW	I	Careless erase prevention discrimination input. "High": Careless erase prevention.
65	BRIGHT B	I	Brightness control dial input (B phase)
66	VTR SYNC	I	Composite sync signal input
67	Hi8 MP SW	I	Hi8 MP tape discrimination input. "High": Hi8 MP tape.
68	DRUM PG	I	Drum PG input FRC (high precision timer) capture input pin
69	DRUM FG	I	Drum FG input FRC (high precision timer) capture input pin
70	CAP FG	I	Capstan FG input FRC (high precision timer) capture input pin
71	MP * E	O	When a Hi8MP tape is used and E mode is activated, this output becomes "High".
72	ME/MP	O	ME/MP tape discrimination output. "High": ME tape.

Pin No.	Signal Name	I/O	Function
73	TAPE LED CONT	O	Tape top/end sensor LED drive control. "High": LED ON.
74	VA PB	O	Video/audio system REC/PB mode changeover. "High": PB mode.
75	CAP PWM	O	PWM output pin for capstan error output. Output pin dedicated to servo (PWM mode).
76	DRUM PWM	O	PWM output pin for drum error output. Output pin dedicated to servo (PWM mode).
77	CFG HMS	I	HMS counter capstan FG input (event counter input)
78	BRIGHT A	I	Brightness control dial input (A phase)
79	VTR SI	I	Serial data input from LCD microcomputer
80	VTR SO	O	Serial data output to VTR system
81	VTR SCK	O	Serial clock output to VTR system
82	LP/SP	O	SP/LP mode discrimination signal output. "Low": SP mode.
83	VIDEO MUTE	O	Video mute output to VTR system
84	CLOG DET	O	Clog detection signal input. "High": Clog.
85	REF PILOT	O	ATF reference pilot signal output to ATF IC
86	SP/LP DET	I	SP/LP mode discrimination signal input. "High": SP mode, during FF, REV, CUE, REV, EDIT(-).
87	NC	-	
88	VSS	-	GND
89	VDI	-	EVER 5V
90	(VPP)	-	EVER 5V
91	PB MUTE 2B	O	Control signal for preventing crosstalk from other head in playback mode. "High": Mute
92	PB MUTE 1B	O	
93	PB MUTE 2A	O	
94	PB MUTE 1A	O	
95	REC 2B	O	Drum head (1A, 2A, 1B, 2B) changeover recording timing signal. "Low": REC.
96	REC 1B	O	
97	REC 2A	O	
98	REC 1A	O	
99	RF SWP	O	RF SWP output pin
100	1/2 RF SWP	O	1/2 RF SWP output pin. "Low": A-ch; "High" B-ch.

1-10. MODE CONTROL TERMINAL DESCRIPTION VS-76 BOARD IC602 (μ PD75304)

Pin No.	Signal Name	I/O	Function
1	S12	O	Segment signal output
2	S13	O	LCD segment terminal drive
3	S14	O	
4	S15	O	
5	S16	O	
6	S17	O	LCD segment signal output pin (output of one of four values: 0, 1.7, 3.3, 5V).
7	S18	O	
8	S19	O	
9	(S20)	O	
10	(S21)	O	Not used
11	(S22)	O	
12	(S23)	O	
13	LINE MIX	O	
14	(S25)	O	Audio system control signal
15	(S26)	O	
16	(S27)	O	
17	(S28)	O	
18	(S29)	O	Not used
19	(S30)	O	
20	(S31)	O	
21	COM 0	O	
22	COM 1	O	LCD common terminal drive output for common signal output
23	COM 2	O	
24	COM 3	O	
25	BIAS	O	
26	VLC 0	I	Output pin used for external divided resistor cut. Power input.
27	VLC 1	I	Power for LCD drive. Normally 0V. For backup, 3V is input.
28	VLC 2	I	Power for LCD drive. Normally 1.7V. For backup, 3V is input.
29	EDIT SW	I	Power for LCD drive. Normally 3.3V. For backup, 3V is input.
30	MAIN SW	I	Edit switch input
31	SUB SW	I	Bilingual main switch input
32	VTR DD ON	I	Bilingual sub switch input
33	VSS	-	VTR system power control signal input
34	JACK OUT/IN	I	GND
35	WIND SW	I	Line input/output chanegover switch input
36	Hi8 SW	I	Wind reduction switch input
37	AUTO LOCK SW	I	Hi8 auto/OFF switch input
38	BATT IN	I	Auto lock switch input
39	VTR SCK	I	Set "Low" to switch to 32 kHz clock. Set "High" to switch to 4.19MHz clock. When battery is OFF, set "Low".
40	VTR SI	O	Serial clock input from servo/system control
41	VTR SO	I	Serial data input from servo/system control
42	SIRCS IN	I	Serial data input from servo/system control
			SIRCS signal input

Pin No.	Signal Name	I/O	Function
43	LCD CS	I	Chip select signal from servo/system control
44	LJ PRE END	I	Lithium battery pre end detection. Normally "High". When battery voltage is reduced, this input becomes "Low".
45	E DET	I	Hi8/normal discrimination input in playback mode. "High": Hi8.
46	PB 1.7M DET	I	Input which discriminates between stereo and bilingual/monaural in playback mode. "High": Stereo or bilingual.
47	JACK MONO	I	Audio line IN/OUT jack monaural detection
48	MIC MONO	I	Mic jack monaural detection
49	S IN	I	S video connector connected/not connected detection
50	MX SEL 1	O	Audio block L-ch/R-ch select signal
51	MX SEL 2	O	
52	COMPOSITE REC	O	When VTR mode, line input is selected, this output becomes "High".
53	E/L	O	Hi8/normal mode output. "High": Hi8.
54	VDD	-	Back up VDD
55	XT1	I	Clock oscillation 32kHz
56	XT2	O	
57	NC		
58	X1	I	Clock oscillation 4.19MHz
59	X2	O	
60	1991/1991	I	Date setting. "High": Start from 1991; "Low": Start from 1990. This input is set "High" in this unit.
61	MONO	O	Stereo/monaural changeover output. "High": Monaural.
62	MX ON/OFF	O	Matrix IC ON/OFF signal
63	IN/OUT	O	INPUT/OUTPUT changeover output
64	DST SW	I	Summer time switch input
65	AREA SW	I	Area switch input
66	DATE SW	I	Date switch input
67	TIME SW	I	Time switch input
68	LCD RESET	I	Reset
69	S0	O	Clock oscillation circuit dividing output (512kHz)
70	S1	O	LCD segment signal output pin. Not used.
71	S2	O	LCD segment signal output pin (output of one of four values: 0, 1.7, 3.3 and 5V).
72	S3	O	
73	S4	O	
74	S5	O	
75	S6	O	
76	S7	O	
77	S8	O	
78	S9	O	
79	S10	O	
80	S11	O	

SECTION 2 SERVICE MODE

☆This unit adopts the camera adjustment and the EVR (Electronic Variable resistor) with the SENSER LANC system.

2-1. SENSER LANC

SENSER LANC is the LANC format to adjust the EVR (Electronic Variable resistor) of Video 8 Handycam and to perform tests by using the LANC (control L). This word stands for the same as the SERVICE LANC formerly used, however, the unified word "SENSER LANC" will be used with this substantial functions.

2-2. HOW TO USE RM-95 JIG (REMOTE CONTROL FOR ADJUSTMENT)

RM-95 jig is used to operate the SENSER LANC. HOLD switch of this jig is remodelled for service to get the SENSER LANC mode. Replacing microcomputer in RM-95 is required for the old-model RM-95 jig, which has no page display function.

Old model	μ PD7503G-A71-12	8-759-142-56	Page is not displayed (Replacing microcomputer is required)
	μ PD7503G-C23-12	8-759-146-77	
New model	μ PD7503G-C56-12	8-759-148-35	Page is displayed

LCD display of RM95

Page Data Address

Example

This means that the page 1 and address 3D is data of 37.

2-3. Reference between Data and Bit

When the data is 37 $\Rightarrow$ Bit

7	6	5	4	3	2	1	0
0	0	1	1	0	1	1	1

Page	Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	3D	MP-HG		ME/MP	REC PROOF	V MUTE	A MUTE	JOG	VA PB MODE
		0	0	1	1	0	1	1	1

The data in the above list means as follows :

ME SW ON
 REC PROOF SW ON
 Audio mute ON
 JOG.....ON
 VA PB MODE.....ON

2-4. TRANSFER METHOD OF THE SERVICE MODE WITH RM-95

LCD display
(HEX model)
P : DD : AA
(F : 00 : 00)

Data display
Set address data is displayed. The
page input first from the normal
condition is set to 0.

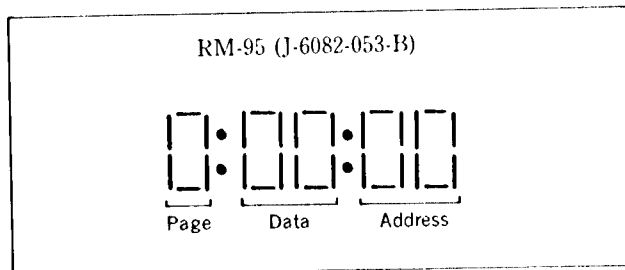
7 t s	(Note 1)	START	Normal mode		
		"HOLD" ON	Service mode is transferred.		
	(Note 2)	"EDIT+/-" PUSH	PAGE change	Refer Memory Map	P : 00 : 00
		"FF/REW" PUSH	ADDRESS change		P : DD : AA
	(Note 3)	"PB/STOP" PUSH	DATA change		
		"PAUSE" PUSH	DATA STOP		
		"HOLD" OFF			

When selecting the page not being
built-in, the data value set previously
becomes indefinite. When modifying
in the built-in page, the address is not
changed.

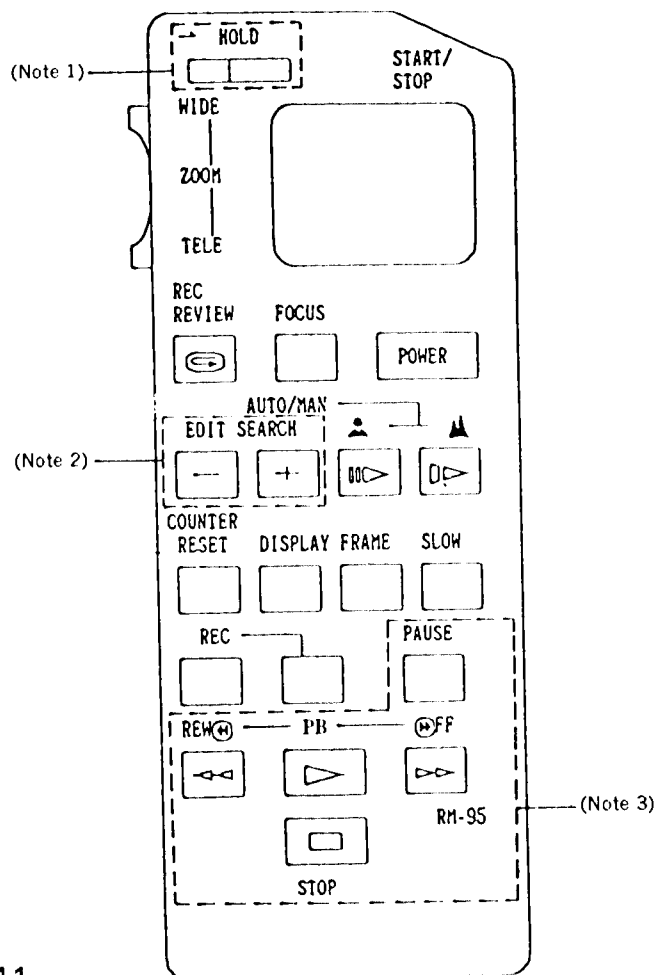
<When ADJ data is modified>
EVR value (RAM) is updated to the
modified data. (It is not written into
EE PROM)

Write into EE PROM.
When writing into EE PROM, WRITE PROTECT should be
released. When releasing, data of page 1 and address 00
should be set to 01 first.

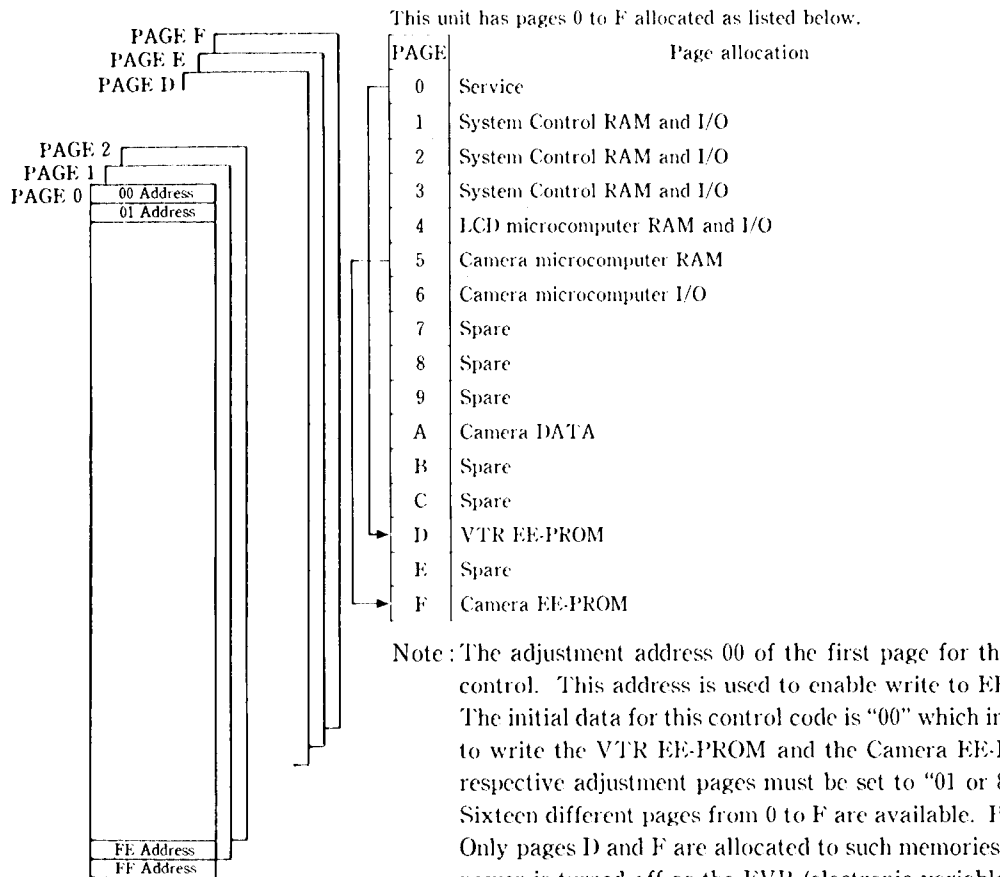
Command name	Command function	Function Button with RM-95
Page Up	Page+ 1	Edit Search+
Page Down	Page- 1	Edit Search-
Direct Page Set	Set to direct page	Event Clear
Address Up	Address+ 1	Fast Forward
Address Down	Address- 1	Rewind
Data Up	Data+ 1	Play Back
Data Down	Data- 1	Stop
Store	Write data into EEPROM. RAM	Pause



RM-95 (J-6082-053-B)



2-5. SENSER LANC Memory Map



Note: The adjustment address 00 of the first page for the RAM is a control code for total control. This address is used to enable write to EE-PROM.

The initial data for this control code is "00" which inhibits write to EE-PROM. In order to write the VTR EE-PROM and the Camera EE-PROM, the control codes for their respective adjustment pages must be set to "01 or 80" as shown by the arrows.

Sixteen different pages from 0 to F are available. Page allocations are as listed above. Only pages D and F are allocated to such memories that will not be cleared even if the power is turned off as the EVR (electronic variable resistor).

2-6. MODES OF SELF-DIAGNOSTIC FEATURE

This unit provides the following ADJUST and TEST Modes:

	MODE	Contents
ADJUST	Camera Adjustment	See Adjustment of Camera System.
	Switching Position Adjustment	} See the appropriate pages.
	Battery Down Adjustment	
TEST	Pass Adjustment Track Shift	When adjusting the tape pass, this mode is selected to shift tracking.
	Emergency STOP Inhibit	This mode inhibits detection of emergency to ensure that : ○ Power will not be turned off even if battery is exhausted (at battery END). ○ Automatic discrimination between SP and LP will not be made. ○ Emergency detection will not be made except for tape TOP/END.
	Emergency Code Read	The conventional emergency display function is added with the following functions : ① Storage in EE-PROM which eliminates a lithium battery. ② Storage of information on the first and the last emergency. ③ Storage of information on the mode when an emergency occurred as well as the contents of the emergency.
	Single Motor Check	This permits normal and reverse rotations and stop of each motor separately. { ○ Drum motor ○ Capstan motor ○ Loading motor }
	Function Switch Check	You can check whether the Function switch of the main body has been accepted or not by specifying a certain address. Also, RM-95 can be used to issue a command in place of the Function switch of the main body.
	Mechanical Switch Check	The contents of the Mechanical and Mode switches can be checked.
	Sensor Check	Input for each of the following sensors is A/D converted and this A/D converted value can be checked. (TOP sensor, END sensor, S REEL FG, T REEL FG, SWP correction thermistor, DEW sensor)
	Received Wireless Remote Control Code Check	The contents of the control code received from the wireless remote control can be checked.

2-7. HOW TO USE PRACTICALLY

How to enter the ADJUST and TEST Modes	
Place RM-95 into Service mode (by turning the HOLD switch "ON").	
How to change and write data	
Press the PAUSE button of RM-95. However, it is not required to press PAUSE for certain RAM and I/O areas.	
Changing and writing data in and to EE-PROM	
PROTECT must be removed before EE-PROM can be changed or written. To remove PROTECT, set as follows :	
PAGE 5	Address 00 Data 80 (Camera system)
PAGE 0	Address 00 Data 01 (VTR system)
In this latest version, the Camera system is also protected.	
How to release from each mode	
Releasing from any EE-PROM area	(Camera system) Be sure to return data on PAGE 5, address 00 to 00 from 80 before turning Service mode of RM-95 OFF. (VTR system) Be sure to return data on PAGE 0, address 00 to 00 from 01 before turning Service mode of RM-95 OFF.
Releasing from any RAM and I/O area	Simply turn either Service mode or power OFF because the data needs not be hold.

2-8. DESCRIPTION OF ADJUST AND TEST MODES

	MODE	PAGE/DATA/ADDRESS	Contents
ADJUST	Switching	D: --: 03 (Low)	This is used to adjust switching position. See page 100 for details.
	Position Adjustment	D: --: 04 (High)	
	Battery Down Adjustment	0: --: 02 (Sensor value) D: --: 02 (Set value)	This is used to adjust Battery Down. See page 99 for details.
TEST MODE	Pass Adjustment Track Shift	0: 03: 01	This is used to adjust track shift for pass adjustment. Write the data specified left and enter Playback mode.
	Emergency Inhibit	0: 01: 01	This inhibits detection of emergency. Power will not be turned off even if battery is exhausted (at battery END). Automatic discrimination between SP and LP will not be made. Emergency detection will be inhibited except for tape TOP/END.
	Emergency Code	D: --: 06	This displays the first emergency.
		D: --: 07	This displays the last emergency. (See * 1) (Bit 0: REC PROOF) (Bit 1: ME/MP) (Bit 2: Normal/HG)
	RECOG Switch Check	2: --: 73	This displays the mode switch position. RECOG Switch ON/OFF status display. (See * 2)
	Function Switch Check	0: --: 18~1B	This checks whether KEY is pressed or not. (See * 3)
	Sensor Check	0: --: 10 (T reel) 0: --: 11 (T reel)	Input for each of the following sensors is A/D converted and this A/D converted value can be checked. (S REEL FG, T REEL FG) (See * 4)
	Received Wireless Remote Control Code Check	4: --: Lower 4 bits of 3A and 3C	The contents of the control code received from the wireless remote control can be checked. (See * 5)

* 1 Emergency Code Check

These codes are displayed on the SENSOR LANC as follows:

(The emergency codes displayed are the first and the last emergency. The last emergency code will be rewritten when an emergency occurs; only the code which occurred first is recorded for the second emergency code.)

			First	Last	
PAGE	D	ADDRESS	06	07	← Emergency code
PAGE	D	ADDRESS	08	09	← Mode when the emergency occurred.

→ After your operation, be sure to rewrite addresses 06 through 09 to data 00.

(1) Emergency Codes List

In this unit, at the occurrence of an emergency, the code will be displayed on the SENSER LANC while it will be written to EE-PROM according to the following specifications:

[Display area]

Page	D	(Information is displayed at the same address of page 0.)
Address	06	Emergency Code First
	07	Emergency Code Last
	08	Emergency Mode First
	09	Emergency Mode Last

- In order to clear the contents of [the first and the last emergency], with the SENSER LANC, write as follows:

[PAGE 0 | Address 00 | Data 01 |

After this, write data 00 to each address.

Then, return to:

[PAGE 0 | Address 00 | Data 00 |

[Emergency Code]

Code		
00		No failure.
01		Loading motor failure.
02		Reel failure during unloading.
03		Other reel failure.
04		Capstan failure.
05		FG failure when drum was started.
06		No PG detection when drum was started.
07		FG failure when drum is in steady state.
08		No PG detection when drum is in steady state.
09		Phase lock failure when drum is in steady state.

(2) Mechanical Modes List

SYMBOL	CODE	Decision-making authority		Code created by the mode controller after transit is complete
		Mode controller	Mechanical controller	
MECHA INITIAL	00	×	×	
MECHA EJECTED	01	○	×	
MECHA UNLOAD	31	○	×	MECHA EJECTED
MECHA UNLOAD EMERGENCY	B1	×	○	MECHA EJECTED
MECHA LOAD	12	(○)•	×	
MECHA LOAD EMERGENCY	A2	×	○	MECHA STOP (NC)
MECHA STOP	02	○	×	
MECHA STOP NC	F2	○	×	
MECHA STOP EMERGENCY 1	B2	×	○	
MECHA STOP EMERGENCY 2	C2	×	○	
MECHA STOP TOP	72	×	○	
MECHA STOP END	62	×	○	
MECHA FF	03	○	×	
MECHA REW	83	○	×	
MECHA REC	04	○	×	
MECHA REC PAUSE	14	○	×	
MECHA REC REVFW	85	○	×	MECHA REC PAUSE
MECHA REC REVRVS	95	○	×	MECHA REC REVFW
MECHA EDITSFW	A5	○	×	
MECHA EDITSRVS	B5	○	×	
MECHA PB	06	○	×	
MECHA CUE	46	○	×	
MECHA REV	56	○	×	
MECHA PB PAUSE	07	○	×	
MECHA EDIT PAUSE	F5	○	×	
MECHA F5 SLOW	27	○	×	
MECHA F29 SLOW	67	○	×	

* : This does not exit as a Final mode.

* 2 RECOG Switch Check

Check the following information displayed on the SENSOR LANC:

Page	Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2	73					V MUTE	MP·HG	ME/MP	REC PROOF

"1"= Normal/0: MPHG -

"1"= ME/0: MP -

"1"= REC inhibit -

Page	Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	68	MSW C	MSW B	MSW A					

Page	Address	Bit 3
2	71	CC LOCK

"1" when cassette compartment is locked.

* 3 Function Switch Check (For the description of the codes, see the previous page.)

With the SENSER LANC, set as follows:

PAGE	0	Address	18~1B	Data	See the list below.
------	---	---------	-------	------	---------------------

	Address 18	19	1A	1B
Data	KEY 0 (AN7)	KEY 1 (AN8)	KEY 2 (AN9)	KEY 3 (AN10)
55	STOP	PAUSE	TITLE ON/OFF	FOCUS ON /OFF
44	FF	REW	TITLE COLOR	FADER
33	ZERO MEMO	RESET	SHUTTER SPEED	BRIGHT LOCK
22	PB	EDIT (-)	WHITE BALANCE	TITLE MEMO
11	REC	EDIT (+)	-	-
00	No make	No make	No make	No make

PAGE	4	Address	20,26,28	Data	See the list below.
------	---	---------	----------	------	---------------------

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address 20	TIME (defined)	DATA (defined)	AREA (defined)	SUMMER TIME (defined)	TIME	DATA	AREA	SUMMER TIME
Address 26	-	BILINGUAL SUB (defined)	BILINGUAL MAIN (defined)	EDIT (defined)	-	BILINGUAL SUB	BILINGUAL MAIN	EDIT
Address 28	AUTO LOCK (defined)	Hi8 (defined)	WIND (defined)	JACK OUT (defined)	AUTO LOCK	Hi8	WIND	JACK OUT

Note : "Defined" is flagged after chattering has been made.

* 4 To Read the A/D Converted Value (Sensor Check)

[Operation]

With the SENSER LANC, set as follows :

PAGE	0	Address	10~13	Data	**
------	---	---------	-------	------	----

Address	Converted value (contents)
10	T-REEL FG
11	S-REEL FG
12	ATF ERROR
13	BATT SENS

The current value for one step of A/D converted data is 4.9 divided by 256±.19mV.

* 5 To Check the Contents of Received Code from Wireless Remote Control

[Operation]

With the SENSER LANC, set as follows :

PAGE	4	Address	3A
------	---	---------	----

The remote control code received will appear on the above page, address. This code will be displayed only when the LANC code is being touched. FF will be displayed when the code is released.

PAGE	4	Address	3C
------	---	---------	----

The category code of the remote control code received will appear in the lower 4 bits on the above page, address. [The description of the remote control codes is omitted in this manual.]

SECTION 3 MECHANICAL ADJUSTMENTS

MECHANICAL ADJUSTMENT

As to mechanical adjustment and check and parts replacement, refer to the separate "8 mm Video Mechanical Adjustment Guide II [FL mechanism (Q mechanism)]".

However, follow these items shown below.

The adjustment and the marks remain the same except this model has the different drum installed.

A-7049-495-A	Rotary upper drum assembly DGR-89-R-(1)
A-7049-498-A	Rotary upper drum assembly DGR-89-R-(2)

3-1. OPERATING WITH THE CASSETTE COMPARTMENT ASSEMBLY REMOVED (See Fig. 3-1.)

1. Loading

- 1) Remove the cabinets and camera block according to the "section 2. DISASSEMBLY" in Service Manual, and supply the power to the unit (Set up the mechanism deck so as to operate.)
- 2) Push into the lock plate release arm ❶ in the direction of arrow, causing the unit to be the loading state.

2. Putting into the playback state

Note : Use SENSER LANC for this adjustment.

- 1) Set to adjustment page 0, adjustment address 01 with adjustment remote control. Then, set TEST MODE for adjustment data 01 or 81.
(When TEST MODE is activated, the rotation sensing for S and T reel turntables and other sensing functions will be suppressed, which allows tape to run.)
- 2) After completing the step 1), set the power switch to VTR.
- 3) Put the cap ❸ on the LED assembly ❷.
- 4) Push into the lock plate release arm ❶ to load.
- 5) Press the playback button.

3. Putting into the recording state

- 1) Perform the step 1) through 4) of 2. Putting into the playback state.
- 2) Secure the push switch ❹ with an adhesive tape ❺.
- 3) Turn on the REC switch.

4. Ejecting

- 1) Push the EJECT button.

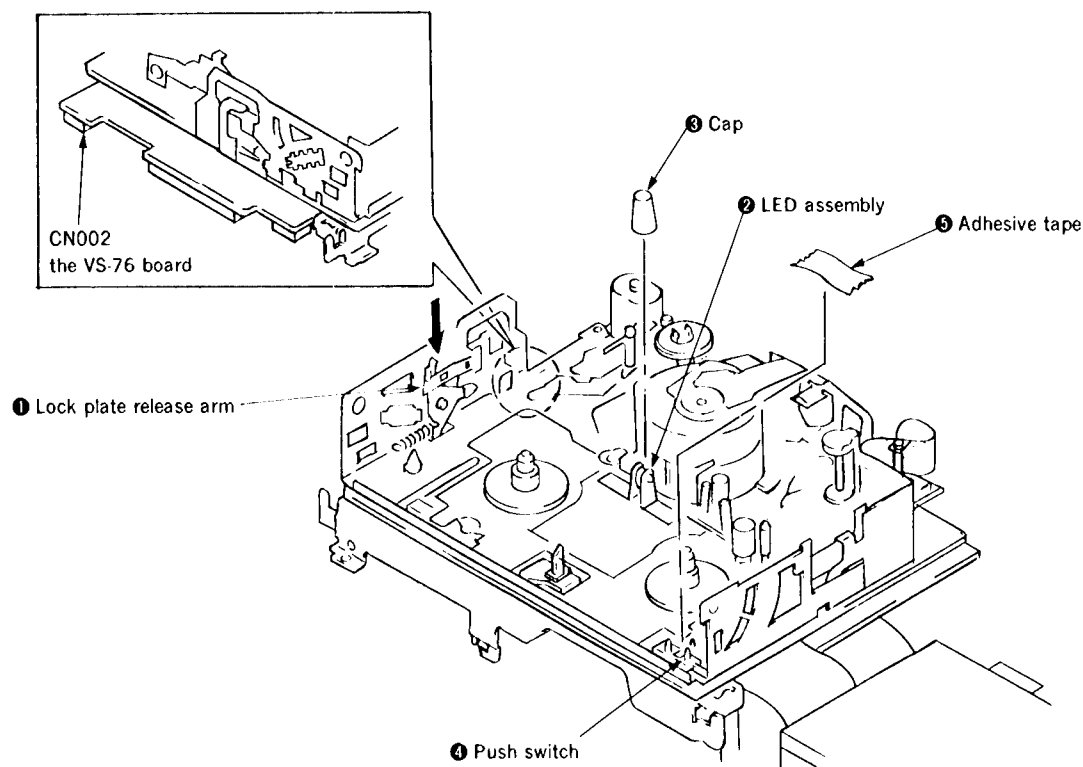


Fig. 3-1.

3-2. TAPE PATH ADJUSTMENT

1. Preparations

- 1) Clean the pass surface (tape guide, drum, capstan shaft and pinch roller.)
- 2) Short circuit Pins ④ and ⑮ of CN002 on the VS-76 board to set to PATH mode.
- 3) Connect to an oscilloscope.
(Channel 1- Pin ⑮ of CN002 on the VS-76 board
External trigger- Pin ④ of CN002 on the VS-76 board)
- 4) Playback the tracking tape (WR5-1N).
- 5) Confirm that the RF waveforms at both sides of the entrance and exit on the oscilloscope are flat.
If not, perform adjustment according to the following.

CN002 on the VS-76 board

1	EJECT SW
2	LANC S10
3	CAP FG
4	PATH MODE
5	REC 2B
6	REC 2A
7	REC 1B
8	REC 1A
9	1/2 RF SWP
10	RF SW P
11	PB RF 2B
12	PB RF 2A
13	PB RF 1B
14	PB RF 1A
15	RF GND
16	PB RF

SECTION 4

CAMERA SECTION ADJUSTMENTS

See the adjusting part location diagram from on page 90 for the adjustment.

4-1. LIST OF SERVICING JIGS

- Oscilloscope • Stabilized power supply (2 units) • Adjusting screwdriver • L. lench • Stop watch
- Color monitor TV • Vectorscope • Desk-top calculator

Ref. No.	Name	Part No.	Use
J-1	Filter (C14)	J-6080-054-A	
J-2	ND filter 0.1	J-6080-807-A	
	ND filter 0.4	J-6080-806-A	
	ND filter 1.0	J-6080-808-A	
J-3	Pattern box PTB-500	J-6029-140-A	
J-4	Color bar chart for pattern box	J-6020-250-A	
J-5	Extension cable (32P)	J-6082-142-A	To connect VC-87 board CN701 and I.D-42 board CN854
	Extension cable (22P)	J-6082-106-A	To connect VC-87 board CN302 and TI-34 board CN801
	Extension cable (20P)	J-6082-133-A	To connect VS-76 board W607 and CF BLOCK CN901
	Extension cable (18P)	J-6082-141-A	To connect VC-87 board CN101 and CD-55 board CN901
J-6	Camera fixing jig	J-6080-894-A	
J-7	Siemens-star chart	J-6080-875-A	
J-8	Adjustment remote control * 1	J-6082-053-B	
J-9	AF microcomputer data reader jig * 2	J-6082-025-A	
J-10	CPA connector jig	J-6082-109-A	

* 1 Microcomputer IC in the adjustment Remote controller except for μ PD7503G-C56-12 (8-759-148-35) does not allow the page selecting. Replace the microcomputer in such a case.

* 2 Change the fixed number of R1 from 10k Ω to 100k Ω in the AF microcomputer data reading jig. (If the number is kept to 10k Ω , the adjustment data can not change because of the difference of the impedance.)

When adjustment the old-model Handy Cam, 100k Ω is allowed to perform the adjustment.

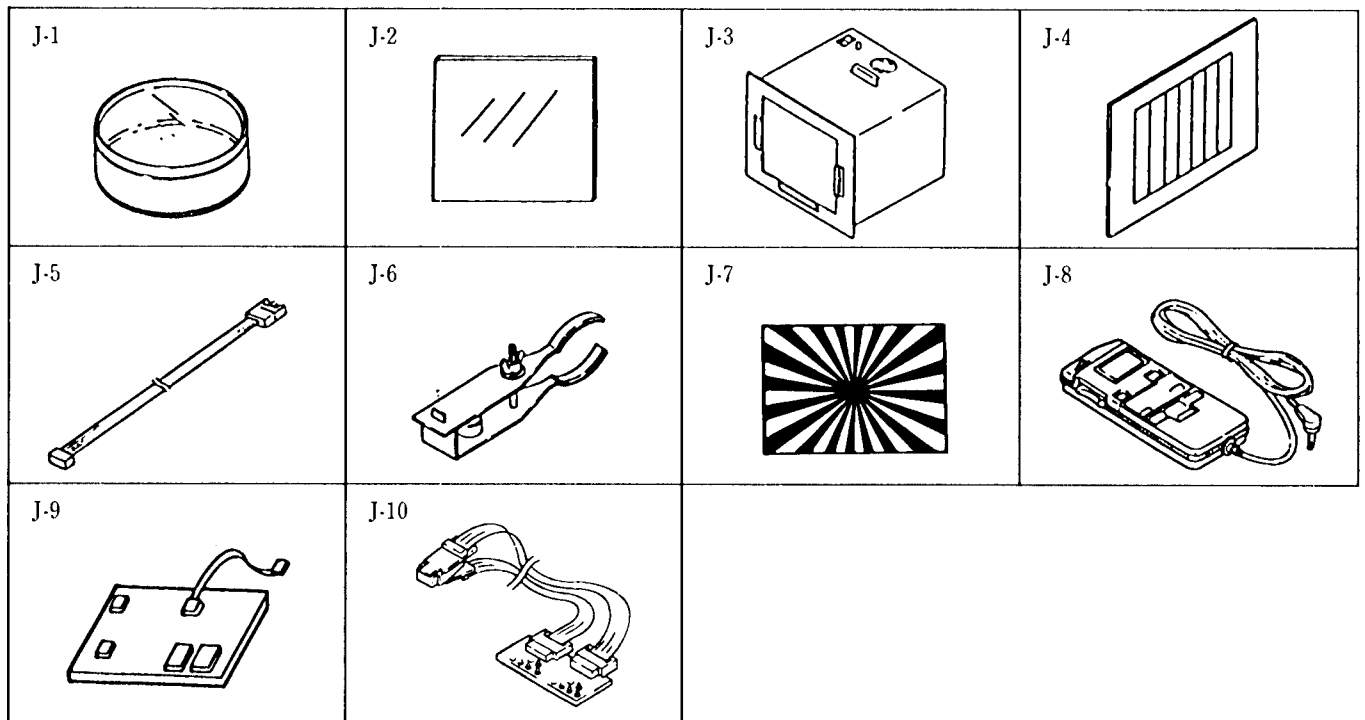


Fig. 4-1.

4-2. PREPARATION FOR ADJUSTMENT

4-2-1. Preparation

Note: Refer to the applicable service manual, "SECTION 2. DISASSEMBLY" for detailed information on the removal procedures for the cabinet and each board.

1) With the extension cables, connect between the camera block and the video block and connect other equipment as shown in Fig. 4-3.

2) EVF (Electrical View Finder) section (VF-40 board) is necessary for checking the shutter speed, white balance mode, etc.

If not necessary, it can be removed by removing CN301 on the VS-76 board.

3) MIC board (MA-81 board) is not required. Remove it by removing CN903 on the MA-81 board.

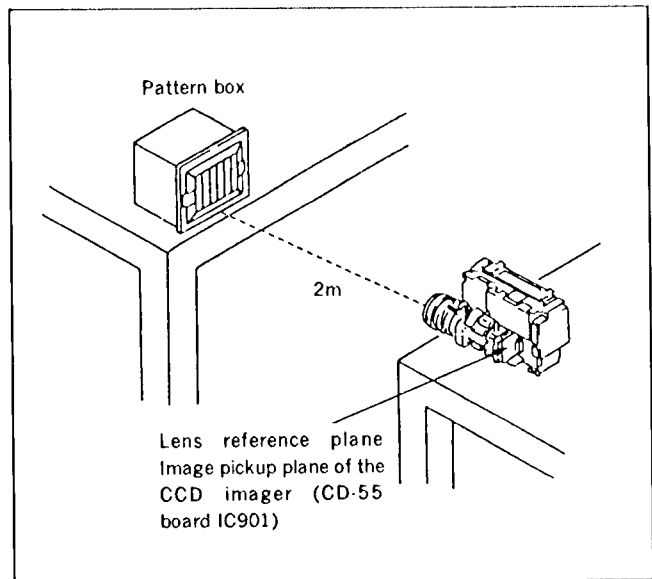


Fig. 4-2.

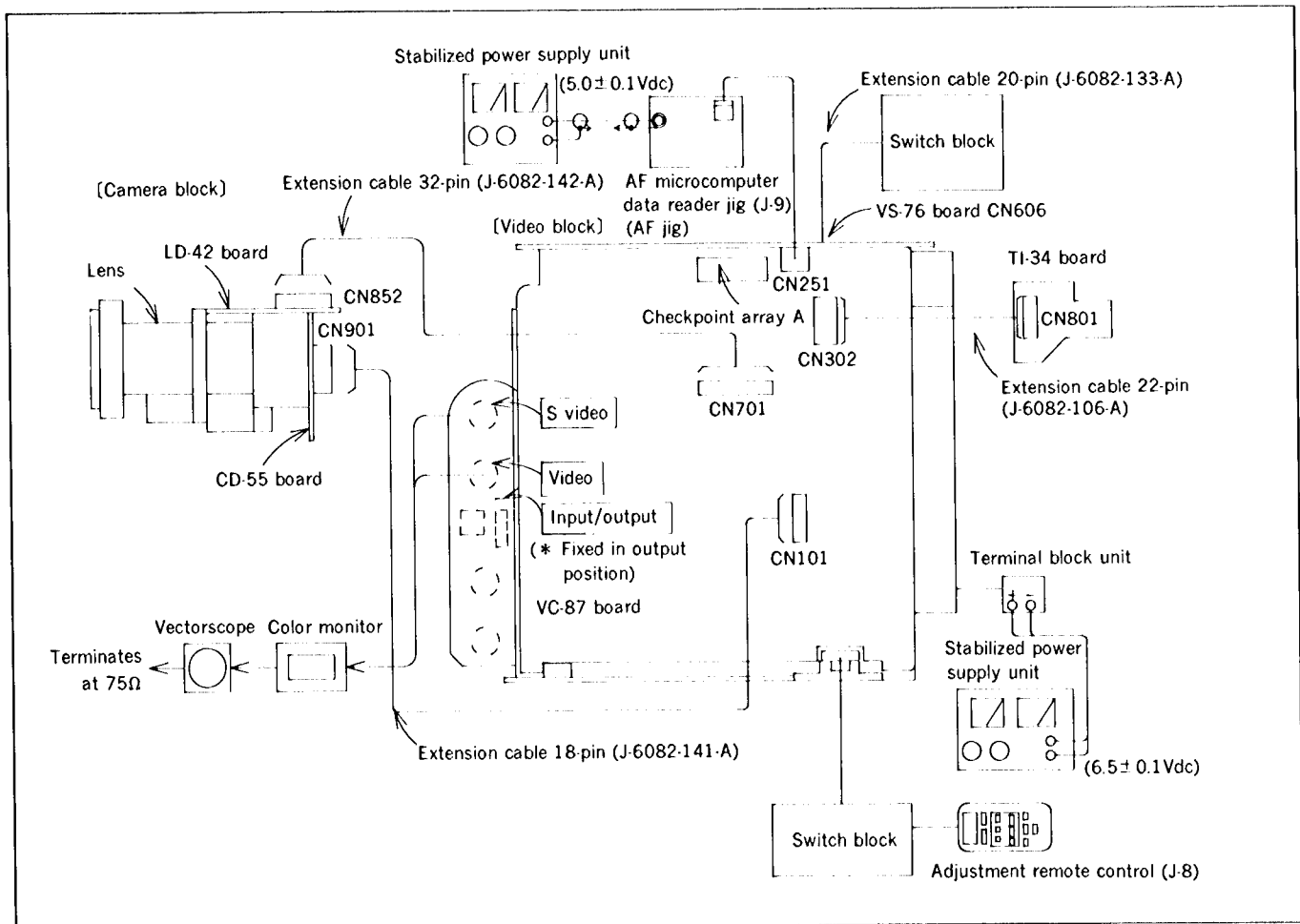


Fig. 4-3.

4-2-2. Caution

- 1) Setting of switches
Unless otherwise specified, set the switches to the following position for making adjustments.
 1. CAMERA/OFF/PLAYER switch
.....CAMERA
 2. STANDBY switch
.....STANDBY
 3. AUTO LOCK switch
.....OFF
 4. WHITE BALANCE button
.....INDOOR mode ("⌘" indication appears on EVF.)
 5. FOCUS button
.....MANUAL
 6. IRIS button
.....CENTER
 7. SHUTTER SPEED button
.....NORMAL
- 2) Adjustment order
As a rule, adjust in described order.
- 3) Objects
 1. Color bar chart (standard picture frame)
When making Adjustments by the use of a color bar chart, adjust the picture frame as shown in Fig. 4-4. (Standard picture frame)

Color Bar Chart Standard Picture Frame

☆ Basically, adjust the color bar chart standard picture frame with the under-scanning monitor as shown in Fig. a.

Fig. a

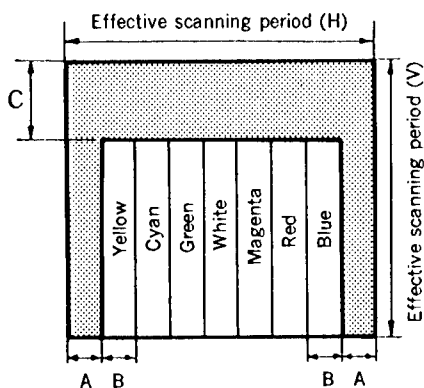


Fig. b

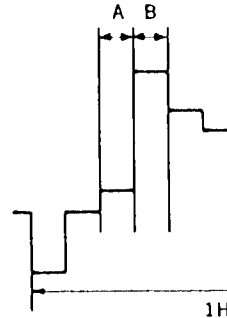


Fig. c

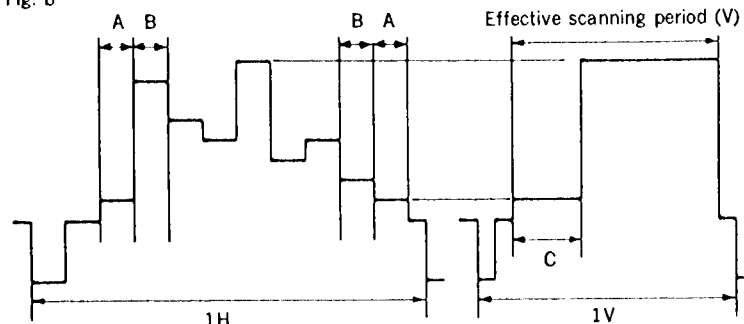
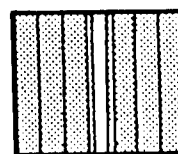


Fig. 4-4.

2. All white pattern
Remove a color bar chart from the pattern box and set fully to the TELE side.
3. High luminance pattern
Prepare a high luminance pattern as shown in Fig. 4-5 and adjust the picture frame as shown in Fig. 4-6.
4. Siemens star (J-6080-875-A)
orient a camera to have the siemens star center coincide with the monitor screen center on a monitor TV screen.

High luminance pattern



Black paper

Cover a color bar chart with black paper, except half the width of its white stripe. Then shoot the chart in this state.

Fig. 4-5.

High luminance pattern

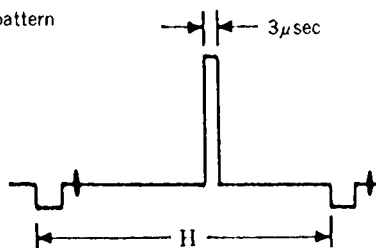


Fig. a (camera output waveform of CPA pin (A8) on VC-87 board)

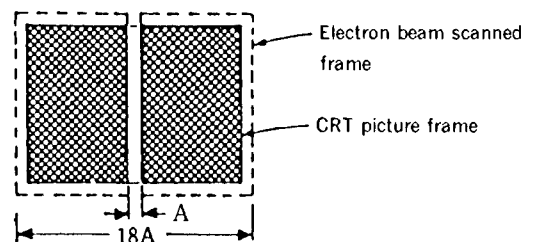


Fig. b (Picture of monitor TV screen)

By operating the camera zooming and orientation have the Fig. a output waveform output and the Fig. b monitor TV image displayed.

Fig. 4-6.

5. Chart for flange back adjustment

Prepare a chart as shown in Fig. 4-7 by combining white and black sheets of vellum paper of A0 size (1189mm×841mm).

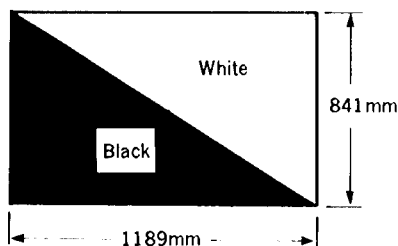


Fig. 4-7.

Note: Nonreflective, glazed vellum paper should be used. Prepare so that there is no concave or convex in the border between the black and white parts.

4-2-3. Adjustment Remote Control and Adjustment Address

The camera block uses the EVR (Electronic Variable Resistor) as an adjustment element in place of a conventional semi-fixed resistor. This EVR is controlled by the EVR/AWB microcomputer (VC-87 board IC261). This microcomputer reads data written in a non-volatile memory within the microcomputer and sends it to the EVR. The EVR generates an adjustment voltage by digital-to-analog converting this data (8 bits for one adjustment point).

To adjust the camera block, therefore, it is required to rewrite the adjustment data written in the non-volatile memory. The adjustment remote control is used for this purpose. The remote control permits bidirectional communications with the microcomputer in the camera block through a remote control signal line (LANC). UP/DOWN commands for adjustment page, address and data are sent from the remote control to the microcomputer in the camera block. Sent from the microcomputer in the camera block to the remote control are adjustment page, address and data.

Note: The microcomputer IC within the adjustment remote control, if other than new microcomputer (μ PI7503G-C56-12), does not allow page selection. If so, replace it by new microcomputer (8-759-148-35).

1. How to Use the Adjustment Remote Control

- 1) Connect the adjustment remote control to the REMOTE terminal (HL-1 board J501).

Note: Place the HOLD switch on the adjustment remote control in the HOLD position (SERVICE position) to enter ADJ Mode.

- 2) Turn the power to the main unit ON.
- 3) If the connection is correct, the following display will appear on the adjustment remote control LCD. (The adjustment data varies from set to set.)

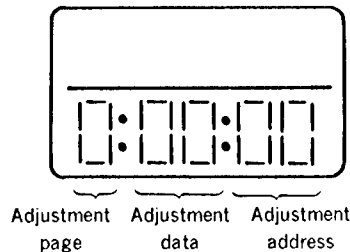


Fig. 4-8.

- 4) Specify the desired adjustment page with the adjustment remote control.

Press the EDIT SEARCH (+) button to increment the adjustment page. Press the EDIT SEARCH (-) button to decrement it.

- 5) Specify the desired adjustment address with the adjustment remote control. Press the FF (▶▶) button to increment the adjustment address. Press the REW (◀◀) button to decrement it.

(Adjustment addresses are expressed in their hexadecimal numbers and there are 256 numbers from 00 to FF. These adjustment addresses correspond to the EVR output pins (IC204, IC251 and IC255 on VC-87 board). See Table 4-2 for the contents of the adjustment for each address.)

- 6) Adjust by increasing or decreasing the adjustment data at a specific address.

Press the PLAY (▶) button to increase the adjustment data.

Press the STOP (■) button to decrease it.

- 7) To adjust on page D, set the data on page 0, address 00 to 01.

To adjust on page F, set the data on page 5, address 00 to 01 or 80. (this releases PROTECT)

- Adjustment data are expressed in their hexadecimal numbers and there are 256 numbers from 00 to FF.

Hexadecimal No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Indication of LCD	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Decimal converted value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Table 4-1.

- These adjustment data correspond to the EVR output voltages (IC204, IC251 and IC255 on VC-87 board) as follows:

VC-87 board IC204 outputs 2.0 to 4.9Vdc ; VC-87 board IC251 outputs 0 to 4.9Vdc ; VC-87 board IC255 outputs 1.0 to 3.5Vdc.

These output voltages can be varied in 256 steps within their ranges.)

- 8) To store adjustment data into the built-in non-volatile memory in the EVR/AWB microcomputer (VC-87 board IC261), press the PAUSE button on the adjustment remote control. (If this operation is omitted, new adjustment data will not be stored into the non-volatile memory.)
- 9) There is a function provided to make a note of the last error/failure caused during operation of the set by the COUNTER RESET button so that its information will be maintained even after the power is turned off. This LAST MEMO EMERGENCY (last error/failure) can be cleared.

2. Caution for Using the Adjustment Remote Control

An erroneous operation of the adjustment remote control may delete correct adjustment data. To avoid this, it is recommended to make a note of all the adjustment data before entering adjustment and to make a note of new adjustment data each time adjustment for one item is completed.

3. List of Adjustment Addresses

- Use the adjustment page F for camera part adjustment of this unit.

Adjustment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column
01	VC-87 board IC204 pin⑩	R CONT	} Auto white balance adjustment		
02	VC-87 board IC204 pin⑨	B CONT			
03	VC-87 board IC204 pin②	C ₁ GAIN	Matrix (3) C ₁ gain adjustment		
04	VC-87 board IC204 pin③	B GAIN	} Pre-white balance adjustment		
05	VC-87 board IC204 pin④	R GAIN			
06	VC-87 board IC204 pin⑤	Y ₂ GAIN	Matrix (2) Y ₂ gain adjustment		
07	VC-87 board IC204 pin⑥	Y ₁ GAIN	Matrix (1) Y ₁ gain adjustment		
08	VC-87 board IC204 pin⑦	Y _H GAIN	Y _H level adjustment		
09	VC-87 board IC204 pin⑧	R-Y GAIN	} Color reproducibility adjustment		
0A	VC-87 board IC204 pin⑨	B-Y GAIN			
0B	VC-87 board IC204 pin⑫	R-Y HUE			
0C	VC-87 board IC204 pin⑬	B-Y HUE			
0D	VC-87 board IC251 pin⑩	SHP LEVEL	H aperture adjustment		
0E	VC-87 board IC251 pin⑨	Y LEVEL	White clip, Y level adjustment		
0F	VC-87 board IC251 pin②	VAP GAIN		90	
10	VC-87 board IC251 pin③	SET UP	Set up adjustment		
11	VC-87 board IC251 pin④	C LEVEL	Chroma level adjustment		
12	VC-87 board IC251 pin⑤	VSUB CONT	V SUB adjustment		
13	VC-87 board IC251 pin⑥	PG CONT	PG CONT adjustment		
14	VC-87 board IC251 pin⑦	Y _γ CONT		AE	
15	VC-87 board IC251 pin⑧	WHITE CLIP	White clip adjustment		
16	VC-87 board IC251 pin⑨	SYNC LEVEL	Sync level adjustment		
17	VC-87 board IC251 pin⑫	BURST LEVEL	Burst level adjustment		
18	VC-87 board IC251 pin⑬	MAX GAIN	Set up, Max gain adjustment		
19	VC-87 board IC255 pin⑩	IRIS REF	Iris adjustment		
1A	VC-87 board IC255 pin⑨	AGC REF	AGC adjustment		
1B	VC-87 board IC255 pin②	HALL GAIN	} Hall adjustment		
1C	VC-87 board IC255 pin③	HALL OFFSET			
1D	VC-87 board IC255 pin④	FADER MODE		00	
1E	VC-87 board IC255 pin⑤	R-Y MIX		FF	
1F	VC-87 board IC255 pin⑥	B-Y MIX		8E	
20	VC-87 board IC255 pin⑦	TH CONT		1D0	
21	VC-87 board IC255 pin⑧	FADER CONT		00	
22	VC-87 board IC255 pin⑨	ZOOM SPEED		00	
23	VC-87 board IC255 pin⑫	M IRIS CONT		00	
24	VC-87 board IC255 pin⑬	M AGC CONT		00	
25		S LANC DRIVE		00	
26		FB TELE SLOW		E0	
27		FB PEAK H		0A	
28		FB PEAK L		BB	
29		FOCUS LIMIT		FF	

Fig. 4-2.(1)

Adjustment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column
2A		ZOOM SPEED 1		20	
2B		ZOOM SPEED 2		08	
2C		ZOOM SPEED 3		3D	
2D		FOCUS STEP H		01	
2E		FOCUS STEP L		20	
2F		TELE PEAK TH		10	
30		FB WIDE TIME		00	
31		FB ZOOM H		03	
32		FB ZOOM L		D0	
33		NOSERVO TIME		FF	
34		INIT STEP H			
35		INIT STEP L			
36		WEATHER TH		A0	
37		IN-OUT TH		60	
38		TELE DATA H			
39		TELE DATA L			
3A		NORM WIDE H			
3B		NORM WIDE L			
3C		NOSERVO SPD		20	
3D		HANT F SPD		06	
3E		PEAK BTM H		01	
3F		PEAK BTM L		95	
40		JIG 0	Auto focus check		
41		JIG 1			
42		JIG 2			
43		JIG 3			
44		JIG 4			
45		JIG 5			
46		T ZOOM LMT H		0F	
47		T ZOOM LMT L		E8	
48		W ZOOM LMT H		00	
49		W ZOOM LMT L		14	
4A		WIDE STEP H		00	
4B		WIDE STEP L		E7	
4C		FH SLOPE 1		08	
4D		FH SLOPE 2		08	
4E		LANC TELE		C2	
4F		LANC WIDE		3E	
50		FH WHITE		02	
51		FH AGC		03	
52		FH BLACK		14	
53		FA WHITE		01	
54		FA AGC		02	

Fig. 4-2.(2)

Adjustment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column
55		FA BLACK		06	
56		HANT Z SPD		00	
57		MF TELE		90	
58		MF WIDE		80	
59		ERR ENA STEP		05	
5A		FH REF		40	
5B		WIDE COUNT 2		02	
5C		EMER ENABLE		00	
5D		JIG 1 PAGE	Auto focus check	00	
5E		ABS POSI H		00	
5F		ABS POSI L		00	
60		-			
61		-			
62		-			
63		M IRIS REF	Manual iris data adjustment		
64		GAIN REF	Manual gain data adjustment		
65		GAIN MAX		F0	
66		-			
67		-			
68		-			
69		-			
6A		-			
6B		-			
6C		-			
6D		-			
6E		-			
6F		-			
70		IRIS F1.7		44	
71		IRIS F2		60	
72		IRIS F2.4		73	
73		IRIS F2.8		84	
74		IRIS F3.4		8E	
75		IRIS F4		96	
76		IRIS F4.8		9D	
77		IRIS F5.6		A2	
78		IRIS F6.8		A7	
79		IRIS F8		AC	
7A		IRIS F9.6		B0	
7B		IRIS F11		B5	
7C		IRIS F14		BD	
7D		IRIS F16		C9	
7E		IRIS F19		CF	
7F		IRIS F22		D5	

Fig. 4-2.(3)

Adjustment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column
80					
81					
82					
83					
84					
85					
86					
87					
88					
89					
8A					
8B					
8C					
8D					
8E					
8F					
90		R3200 MSB			
91		R3200 LSB			
92		B3200 MSB			
93		B3200 LSB			
94		G3200 MSB			
95		G3200 LSB			
96		SHUTTER IN		B1	
97		SHUTTER OUT		8B	
98		IRIS IN		89	
99		IRIS OUT		9A	
9A					
9B					
9C					
9D					
9E					
9F					
A0					
A1					
A2					
A3					
A4					
A5					
A6					
A7					
A8					
A9					

Fig. 4-2.(4)

Adjustment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column
AA		-			
AB		-			
AC		BTM SLP R		48	
AD		BTM SLP B		78	
AE		MDL SLP R		60	
AF		MDL SLP B		40	
B0		TOP SLP R		66	
B1		TOP SLP B		18	
B2		KEIKO R		66	
B3		KEIKO B		18	
B4		BTM UP		C2	
B5		BTM DWN		95	
B6		MDL UP		AD	
B7		MDL DWN		96	
B8		TOP UP		78	
B9		TOP DWN		60	
BA		KEIKO		6C	
BB		KEIKO DWN		60	
BC		R TOP LMT		6E	
BD		R DWN LMT		21	
BE		B TOP LMT		8C	
BF		B IN TOP		65	
C0		B IN MAX		5C	
C1		B OUT MIN		5C	
C2		B OUT DWN		4A	
C3		B DWN LMT		1B	
C4		LL LMT		06	
C5		TM DIVID		5C	
C6		BM DIVID		39	
C7		DELAY TM		08	
C8		FAST TM		40	
C9		OUT HYS OFF		0E	
CA		OUT B HYS		07	
CB		-			
CC		-			
CD		-			
CE		APCNCUT STRT		C0	
CF		APCNCUT SLPE		01	
D0		SYS CONFIG		00	
D1		-			
D2		-			

Fig. 4-2.(5)

Adjust- ment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column																																		
D3		-																																					
D4		-																																					
D5		-																																					
D6		-																																					
D7		-																																					
D8		-																																					
D9		-																																					
DA		-																																					
DB		-																																					
DC		-																																					
DD		-																																					
DE		-																																					
DF		-																																					
E0		DISPLAY MODE	The following adjustment modes are selected by changing the adjustment data : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>00</td><td>R CONT, B CONT</td></tr><tr><td>01</td><td>NEW R, NEW B</td></tr><tr><td>02</td><td>R RATIO</td></tr><tr><td>03</td><td>B RATIO</td></tr><tr><td>04</td><td>R GAIN</td></tr><tr><td>05</td><td>B GAIN</td></tr><tr><td>06</td><td>RM DATA</td></tr><tr><td>07</td><td>GM DATA</td></tr><tr><td>08</td><td>BM DATA</td></tr><tr><td>0A</td><td>WHITE R, WHITE B</td></tr><tr><td>0B</td><td>R DATA</td></tr><tr><td>0C</td><td>G DATA</td></tr><tr><td>0D</td><td>B DATA</td></tr><tr><td>0E</td><td>R, B AIM</td></tr><tr><td>0F</td><td>ERROR, ERROR 2</td></tr><tr><td>11</td><td>IRIS, SHTR</td></tr></table>			Adjustment data	Adjustment mode	00	R CONT, B CONT	01	NEW R, NEW B	02	R RATIO	03	B RATIO	04	R GAIN	05	B GAIN	06	RM DATA	07	GM DATA	08	BM DATA	0A	WHITE R, WHITE B	0B	R DATA	0C	G DATA	0D	B DATA	0E	R, B AIM	0F	ERROR, ERROR 2	11	IRIS, SHTR
Adjustment data	Adjustment mode																																						
00	R CONT, B CONT																																						
01	NEW R, NEW B																																						
02	R RATIO																																						
03	B RATIO																																						
04	R GAIN																																						
05	B GAIN																																						
06	RM DATA																																						
07	GM DATA																																						
08	BM DATA																																						
0A	WHITE R, WHITE B																																						
0B	R DATA																																						
0C	G DATA																																						
0D	B DATA																																						
0E	R, B AIM																																						
0F	ERROR, ERROR 2																																						
11	IRIS, SHTR																																						
E1		-																																					
E2		-																																					
E3		-																																					
E4		-																																					
E5		-																																					
E6		-																																					
E7		-																																					
E8		-																																					

Fig. 4-2.(6)

Adjust- ment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column																										
E9		ADJUST MODE	The following adjustment modes are selected by changing the adjustment data : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>00</td><td>NORMAL</td></tr><tr><td>03</td><td>S LANC CONTROL MODE</td></tr><tr><td>05</td><td>AF SKIP MODE</td></tr><tr><td>07</td><td>SERVICE MODE</td></tr><tr><td>09</td><td>FORCED WOBBLING MODE</td></tr><tr><td>0B</td><td>FORCED HATCHING MODE</td></tr><tr><td>0D</td><td>ZOOM HATCHING MODE</td></tr><tr><td>0F</td><td>FLANGE BACK ADJ MODE</td></tr><tr><td>13</td><td>ABS MOVERENT MODE</td></tr></table>	Adjustment data	Adjustment mode	00	NORMAL	03	S LANC CONTROL MODE	05	AF SKIP MODE	07	SERVICE MODE	09	FORCED WOBBLING MODE	0B	FORCED HATCHING MODE	0D	ZOOM HATCHING MODE	0F	FLANGE BACK ADJ MODE	13	ABS MOVERENT MODE								
Adjustment data	Adjustment mode																														
00	NORMAL																														
03	S LANC CONTROL MODE																														
05	AF SKIP MODE																														
07	SERVICE MODE																														
09	FORCED WOBBLING MODE																														
0B	FORCED HATCHING MODE																														
0D	ZOOM HATCHING MODE																														
0F	FLANGE BACK ADJ MODE																														
13	ABS MOVERENT MODE																														
EA		COMMAND MODE	The following adjustment modes are selected when the adjustment data at adjustment address E9 is 03 and 07 : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>03</td><td>SEPARATE MODE</td></tr><tr><td>07</td><td>AUTO FOCUS MODE</td></tr></table>	Adjustment data	Adjustment mode	03	SEPARATE MODE	07	AUTO FOCUS MODE																						
Adjustment data	Adjustment mode																														
03	SEPARATE MODE																														
07	AUTO FOCUS MODE																														
EB		MODE	The following adjustment modes are selected by changing the adjustment data : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>00</td><td>NORMAL MODE</td></tr><tr><td>01</td><td>ZOOM POSITION (High)</td></tr><tr><td>03</td><td>ZOOM POSITION (Low)</td></tr><tr><td>05</td><td>AD HALL</td></tr><tr><td>0B</td><td>AD AGC CONT</td></tr><tr><td>0D</td><td>FOCUS POSITION (High)</td></tr><tr><td>0F</td><td>FOCUS POSITION (Low)</td></tr><tr><td>20</td><td>FOCUS, FA, FH, ZOOM</td></tr><tr><td>21</td><td>Set by addresses 40 to 45</td></tr><tr><td>22</td><td>FB ADJ Results, INIT DATA, TELE, WIDE</td></tr><tr><td>F9</td><td>FA (Evaluation value for variable frame, every V output)</td></tr><tr><td>FR</td><td>FH (Evaluation value for variable frame, every V output)</td></tr></table>	Adjustment data	Adjustment mode	00	NORMAL MODE	01	ZOOM POSITION (High)	03	ZOOM POSITION (Low)	05	AD HALL	0B	AD AGC CONT	0D	FOCUS POSITION (High)	0F	FOCUS POSITION (Low)	20	FOCUS, FA, FH, ZOOM	21	Set by addresses 40 to 45	22	FB ADJ Results, INIT DATA, TELE, WIDE	F9	FA (Evaluation value for variable frame, every V output)	FR	FH (Evaluation value for variable frame, every V output)		
Adjustment data	Adjustment mode																														
00	NORMAL MODE																														
01	ZOOM POSITION (High)																														
03	ZOOM POSITION (Low)																														
05	AD HALL																														
0B	AD AGC CONT																														
0D	FOCUS POSITION (High)																														
0F	FOCUS POSITION (Low)																														
20	FOCUS, FA, FH, ZOOM																														
21	Set by addresses 40 to 45																														
22	FB ADJ Results, INIT DATA, TELE, WIDE																														
F9	FA (Evaluation value for variable frame, every V output)																														
FR	FH (Evaluation value for variable frame, every V output)																														

Fig. 4-2.(7)

Adjust- ment Address	Adjustment Voltage Output Terminal	Adjustment Item	Remarks	Memo Column	Average Column										
EC		AWB MODE 3		01											
ED		AWB MODE 2		00											
EE		AWB MODE 1	The following auto white balance adjust- ment modes are selected by changing the adjustment data : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>00</td><td>NORMAL MODE</td></tr><tr><td>01</td><td>3200K PRESET DATA FETCH</td></tr><tr><td>D0</td><td>OUT DOOR ADJUST- MENT MODE</td></tr><tr><td>F0</td><td>ALL AREA PULL-IN MODE</td></tr></table>	Adjustment data	Adjustment mode	00	NORMAL MODE	01	3200K PRESET DATA FETCH	D0	OUT DOOR ADJUST- MENT MODE	F0	ALL AREA PULL-IN MODE		
Adjustment data	Adjustment mode														
00	NORMAL MODE														
01	3200K PRESET DATA FETCH														
D0	OUT DOOR ADJUST- MENT MODE														
F0	ALL AREA PULL-IN MODE														
EF		CAM ALONE	The following adjustment modes are selected by changing the adjustment data : <table><tr><th>Adjustment data</th><th>Adjustment mode</th></tr><tr><td>00</td><td>NORMAL MODE</td></tr><tr><td>F0</td><td>CAM ALONE MODE</td></tr></table>	Adjustment data	Adjustment mode	00	NORMAL MODE	F0	CAM ALONE MODE						
Adjustment data	Adjustment mode														
00	NORMAL MODE														
F0	CAM ALONE MODE														
F0		-	Office Code												
F1		-	Model Destination Code												
F2		-	Shipping Date Code												
F3		-													
F4		-													
F5		-													
F6		-													
F7		-													
F8		-													
F9		-													
FA		-													
FB		-													
FC		-													
FD		-													
FE		-													
FF		-													

Fig. 4-2.(8)

4-2-4. Checkpoint Array (CPA)

Most points of measurement used for adjusting the camera block are on the checkpoint array of the VC-87 board. Solder a short lead wire, etc. to necessary pins for your adjustment, and connect an oscilloscope or other measuring equipment. Table 4-3 shows the pin numbers and signals for the checkpoint array.

Note: The CPA connector jig can be used to connect an oscilloscope or other measuring equipment easily.

Pin No.	Signal	Pin No.	Signal
A1	N.C	B1	N.C
A2	PG CONT	B2	N.C
A3	N.C	B3	Y LPF OUT
A4	CAM Y (Not allowed to be used for adjustment)	B4	V SUB
A5	VAP OUT	B5	VAP SLICE
A6	TP	B6	N.C
A7	WB-G	B7	Y _H GAIN
A8	CAM Y	B8	Y ₂ GAIN
A9	N.C	B9	N.C
A10	CAM C	B10	GND
A11	YH OUT 1	B11	IRIS OUT

Table 4-3.

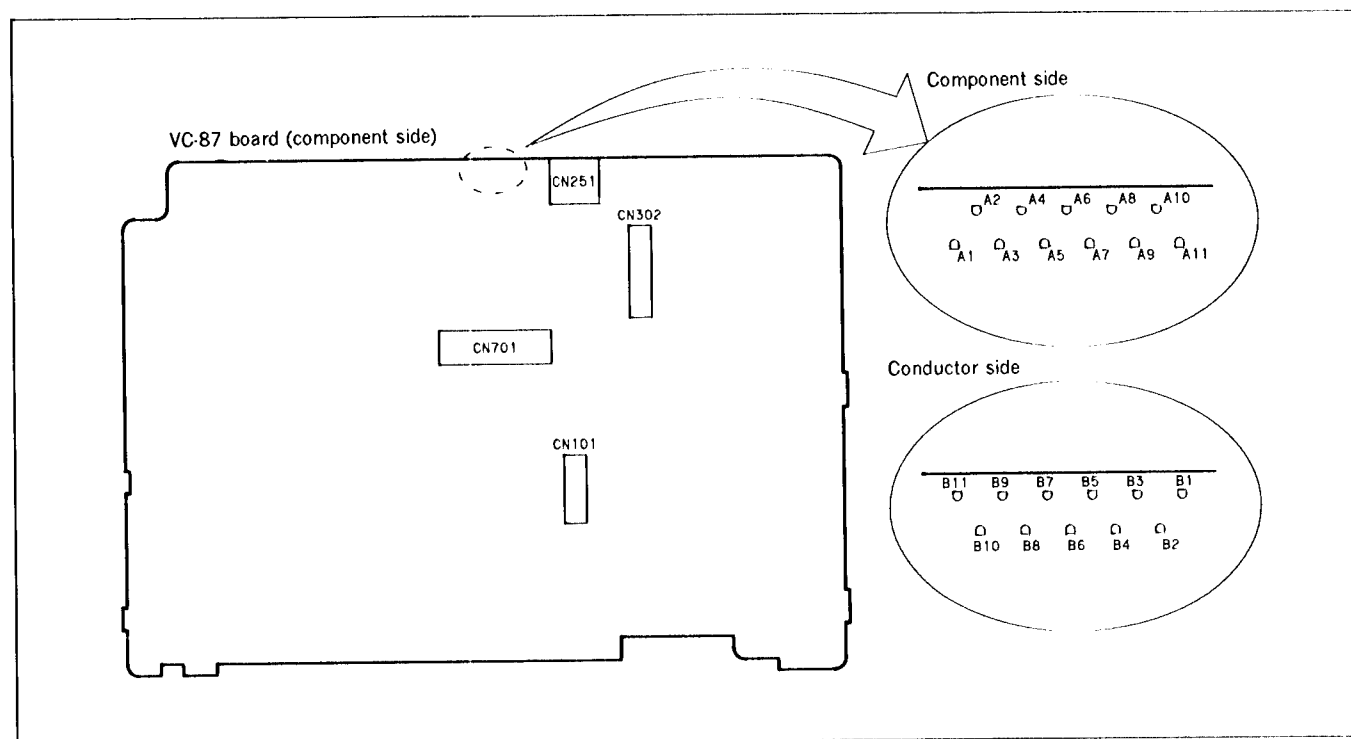


Fig. 4-9.

4-2-5. AF Microcomputer Data Reader Jig

The AF microcomputer data reader jig converts adjustment serial data outputted from the AF microcomputer (different data are outputted depending on the adjustment mode, such

as HALL (iris) state, focus state, focus motor speed, zoom ring position, etc.) into 2-digit hexadecimal numbers and indicates on the LED.

[Connection]

Connect as shown in the figure below :

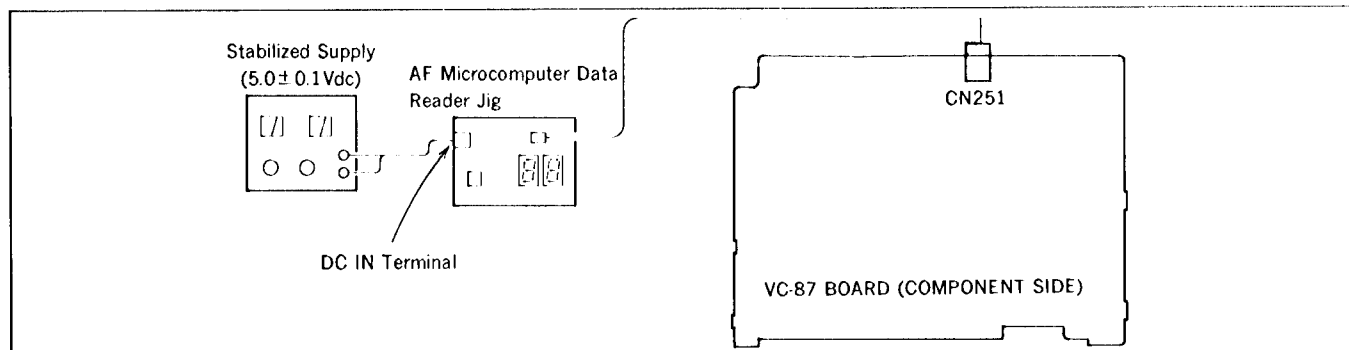


Fig. 4-10.

4-2-6. Data Processing

In order to obtain adjustment data in some adjustment items, it is necessary to compute the display data (hexadecimal number) of the AF microcomputer data reader jig and adjustment remote control.

In this case, convert the hexadecimal number into the decimal number before computation, convert its computed result back into the decimal number to assume it as the adjustment data. Table 4-4 shows a hexadecimal-decimal conversion table.

Hexadecimal — Decimal Conversion Table

Higher Digit of Hex. No. Lower Digit of Hex. No.	0	1	2	3	4	5	6	7	8	9	A (A)	B (B)	C (C)	D (D)	E (E)	F (F)
0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
3	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
4	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
5	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
6	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
7	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
8	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
9	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
A (A)	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
B (B)	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
C (C)	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
D (D)	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
E (E)	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
F (F)	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

Note: Values in parentheses are those displayed on the AF microcomputer reader jig or adjustment remote control.

(Example) When the AF microcomputer reader jig or adjustment remote control displays "BD (B D)"; Since the higher digit of the hexadecimal number is B (B) and its lower digit is D (D), the decimal number to be obtained is "189" at an intersecting point of ① and ② in the table above.

Table 4-4.

4-3. CAMERA SYSTEM ADJUSTMENT

- It is expected that all the adjustments be performed in the sequence that they are described.
- When the CCD imager has been replaced, remember to perform all the adjustments provided for the camera system.

[Adjustment Sequence]

1. Camera DC-DC Converter Voltage Check
2. Camera Microcomputer Data Setting for Adjustment Pages D and F
3. Prime Oscillation Adjustment
4. PG CONT/V SUB Adjustment
5. Sync Level Adjustment
6. Setup Adjustment
7. Iris Adjustment
8. AGC Adjustment
9. Matrix Adjustment
10. Y_H Level Adjustment
11. Chroma Level Adjustment
12. White Clip Adjustment
13. Y Level Adjustment
14. Max Gain Adjustment
15. H Aperture Adjustment
16. Burst Level Adjustment
17. Pre-white Balance Adjustment
18. Color Reproducibility Adjustment
19. Flange Back Adjustment and Check
20. Hall Adjustment
21. Auto White Balance Adjustment
22. Manual Gain Reference Setting
23. Manual Iris Data Adjustment
24. Outdoor White Balance Check
25. Auto Focus Check
26. Brightness Correction Check
27. Digital Titler Picture Quality Check

4-3-1. Camera DC-DC Converter Voltage Check (DD-33 Board)

Measuring instrument	Digital voltmeter
CAM 15V check	
Measurement Point	CN102 pin ⑧ (JL303)
Specified value	$15.0 \pm 0.15\text{Vdc}$
CAM - 9V check	
Measurement Point	CN102 pin ⑦ (JL305)
Specified value	$- 9.00 \pm 0.30\text{Vdc}$
CAM 5V check	
Measurement Point	CN102 pin ⑤ (JL307)
Specified value	$4.92 \pm 0.03\text{Vdc}$

[Checking Method]

- 1) Each power supply voltage meets the specified value at ordinary temperature and humidity.

4-3-2. Camera Microcomputer Data Setting for Adjustment Pages D and F

[D Page Setting Method]

- 1) To release adjustment page D from PROTECT, set to adjustment page 0, adjustment address 00, and adjustment data 01 with the adjustment remote control.
- 2) Set to adjustment page D with the adjustment remote control. Then write the initial value. (See Table 4-5.)
- 3) After changing adjustment data, to store the new data, press the PAUSE button on the adjustment remote control before changing the address.

[F Page Setting Method]

- 1) To release adjustment page F from PROTECT, set to adjustment page 5, adjustment address 00, and adjustment data 80 with the adjustment remote control.
- 2) Set to adjustment page F with the adjustment remote control. Then write the initial value. (See Table 4-6.)
- 3) After changing adjustment data, to store the new data, press the PAUSE button on the adjustment remote control before changing the address.

Note: The adjustment data should be initialized only when the CCD imager is replaced.

The data for the old microcomputer should remain intact when the EVR/AWB microcomputer is replaced.

Table 4-5 VTR EE-PROM Memory Map on Adjustment Page D

Page	Address	Contents	Data	Remarks
D	00	Category Code (destination)	U/C: 11 E : 01	Fixed
	01	Test Mode	00	*
	02	Battery End Adjustment	00	Adjust
	03	Switching Position Adjustment LOW	00	Not used
	04	Switching Position Adjustment HIGH	80	Adjust
	05	Specification Change by Destination Flag	U/C: 41 E : 61	Fixed
	06	Emergency Code First	00	*
	07	Emergency Code Last	00	*
	08	Emergency Mode First	00	*
	09	Emergency Mode Last	00	*
	0A		00	Not used
	0B		00	Not used
	0C		00	Not used
	0D		00	Not used
	0E		00	Not used
	0F		00	Not used
	10	EDIT OFF MP HI8 LP	6F	Fixed
	11	EDIT OFF MP HI8 SP	65	Fixed
	12	EDIT OFF MP NOR LP	5C	Fixed
	13	EDIT OFF MP NOR SP	68	Fixed
	14	EDIT OFF ME HI8 LP	6F	Fixed
	15	EDIT OFF ME HI8 SP	65	Fixed
	16	EDIT OFF ME NOR LP	5C	Fixed
	17	EDIT OFF ME NOR SP	68	Fixed
	18	EDIT ON ** HI8 **	65	Fixed
	19	EDIT ON ** NOR **	5C	Fixed
	1A		00	Not used
	1B		00	Not used
	1C		00	Not used
	1D		00	Not used
	1E		00	Not used
	1F		00	Not used
	20	MP REC C 1A	FF	Adjust
	21	MP REC C 1B	FF	Adjust
	22	MP REC C 2A	FF	Adjust
	23	MP REC C 2B	FF	Adjust
	24	ME PILOT CONT	90	Fixed
	25	ME RF CONT	58	Fixed
	26	ME REC C 1A	FF	Adjust
	27	ME REC C 1B	FF	Adjust
	28	ME REC C 2A	FF	Adjust
	29	ME REC C 2B	FF	Adjust
	2A	REC Y	FF	Adjust
	2B	C FG OFF SET	80	Adjust
	2C	MP PILOT CONT	90	Fixed
	2D	MP RF CONT	58	Fixed
	2E		00	Spare
	2F		00	Spare
	30		00	Spare
	31		00	Spare

Note: "*" mark represents the TEST and SERVICE Modes.

Table 4-6. Preset Data of Adjustment Page F.

Adjustment Address	Adjustment Data Initial Value
01 (R CONT)	61
02 (B CONT)	6C
03 (C1 GAIN)	88
04 (B GAIN)	8D
05 (R GAIN)	84
06 (Y2 GAIN)	9B
07 (Y1 GAIN)	A2
08 (YH GAIN)	32
09 (R-Y GAIN)	B5
0A (B-Y GAIN)	84
0B (R-Y HUE)	5A
0C (B-Y HUE)	50
0D (SHP LEVEL)	97
0E (Y LEVEL)	9C
0F (VAP GAIN)	90
10 (SET UP)	95
11 (C LEVEL)	7F
12 (V SUB CONT)	3A
13 (PG CONT)	5A
14 (Y γ CONT)	AE
15 (WHITE CLIP)	FF
16 (SYNC LEVEL)	C2
17 (BURST LEVEL)	D9
18 (MAX GAIN)	E0
19 (IRIS REF)	4C
1A (AGC REF)	72
1B (HALL GAIN)	6E
1C (HALL OFFSET)	8A
1D (FADER MODE)	00
1E (R-Y MIX)	FF
1F (B-Y MIX)	8E
20 (TH CONT)	D0
21 (FADER CONT)	00
22 (ZOOM SPEED)	00
23 (M IRIS CONT)	00
24 (M AGC CONT)	00
25 (S LANC DRIVE)	00
26 (FB TELE SLOW)	E0
27 (FB PEAK H)	0A
28 (FB PEAK L)	BB
29 (FOCUS LIMIT)	FF

Table 4-6 (1)

2A (ZOOM SPEED 1)	20
2B (ZOOM SPEED 2)	08
2C (ZOOM SPEED 3)	3D
2D (FOCUS STEP H)	01
2E (FOCUS STEP L)	20
2F (TELE PEAK TH)	10
30 (FB WIDE TIME)	00
31 (FB ZOOM H)	03
32 (FB ZOOM L)	D0
33 (NOSERVO TIME)	FF
34 (INIT STEP H)	00
35 (INIT STEP L)	C0
36 (WEATHER TH)	A0
37 (IN-OUT H)	60
38 (TELE DATA H)	0F
39 (TELE DATA L)	FF
3A (NORM WIDE H)	00
3B (NORM WIDE L)	00
3C (NOSERVO SPD)	20
3D (HANT F SPD)	06
3E (PEAK BTM H)	01
3F (PEAK BTM L)	95
46 (T ZOOM LMT H)	0F
47 (T ZOOM LMT L)	E8
48 (W ZOOM LMT H)	00
49 (W ZOOM LMT L)	14
4A (WIDE STEP H)	00
4B (WIDE STEP L)	E7
4C (FH SLOPE 1)	08
4D (FH SLOPE 2)	08
4E (LANC TELE)	C2
4F (LANC WIDE)	3E
50 (FH WHITE)	02
51 (FH AGC)	03
52 (FH BLACK)	14
53 (FA WHITE)	01
54 (FA AGC)	02
55 (FA BLACK)	06
56 (HANT Z SPD)	00
57 (MF TELE)	90
58 (MF WIDE)	80
59 (ERR ENA STEP)	05

Table 4-6 (2)

5A (FH REF)	40
5B (WIDE COUNT 2)	02
5C (EMER ENABLE)	00
5D (JIG 1 PAGE)	00
5E (ABS POSI H)	00
5F (ABS POSI L)	00
63 (M IRIS REF)	AA
64 (GAIN REF)	23
65 (GAIN MAX)	E0
70 (IRIS F1.7)	44
71 (IRIS F2)	60
72 (IRIS F2.4)	73
73 (IRIS F2.8)	84
74 (IRIS F3.4)	8E
75 (IRIS F4)	96
76 (IRIS F4.8)	9D
77 (IRIS F5.6)	A2
78 (IRIS F6.8)	A7
79 (IRIS F8)	AC
7A (IRIS F9.6)	B0
7B (IRIS F11)	B5
7C (IRIS F14)	BD
7D (IRIS F16)	C9
7E (IRIS F19)	CF
7F (IRIS F22)	D5
90 (R3200 MSB)	10
91 (R3200 LSB)	10
92 (B3200 MSB)	10
93 (B3200 LSB)	10
94 (G3200 MSB)	10
95 (G3200 LSB)	10
96 (SHUTTER IN)	B1
97 (SHUTTER OUT)	8B
98 (IRIS IN)	89
99 (IRIS OUT)	94
AC (BTM SLP R)	48
AD (BTM SLP B)	78
AE (MDL SLP R)	60
AF (MDL SLP B)	40

Table 4-6 (3)

B0 (TOP SLP R)	66
B1 (TOP SLP B)	18
B2 (KEIKO R)	66
B3 (KEIKO B)	18
B4 (BTM UP)	C2
B5 (BTM DWN)	95
B6 (MDL UP)	AD
B7 (MDL DWN)	96
B8 (TOP UP)	78
B9 (TOP DWN)	60
BA (KEIKO)	6C
BB (KEIKO DWN)	60
BC (R TOP LMT)	6E
BD (R DWN LMT)	21
BE (B TOP LMT)	8C
BF (B IN TOP)	65
C0 (B IN MAX)	5C
C1 (B OUT MIN)	5C
C2 (B OUT DWN)	4A
C3 (R DWN LMT)	1B
C4 (L L LMT)	06
C5 (TM DIVID)	5C
C6 (BM DIVID)	39
C7 (DELAY TM)	08
C8 (FAST TM)	40
C9 (OUT HYS OFF)	0E
CA (OUT B HYS)	07
CE (APCNCUT STRT)	C0
CF (APCNCUT SLPE)	01
D0 (SYS CONFIG)	00
EC (AWB MODE 3)	01
ED (AWB MODE 2)	00

Table 4-6 (4)

4-3-3. Prime Oscillation Adjustment (VC-87 Board)

Object	Any
Measurement Point	DT-77 board (HIC101) pin ③ (CL109)
Measuring instrument	Frequency counter
Adjustment element	CT101
Specified value	14318182±71Hz

Note : Connect a frequency counter through a buffer amplifier (etc., oscilloscope) having a high impedance and a low capacitance.

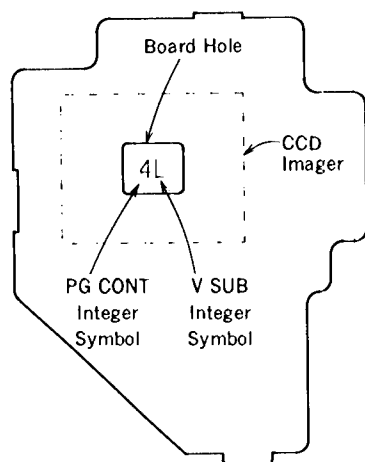
[Adjustment Method]

- 1) Adjust to 14318182±71Hz with CT101.

4-3-4. PG CONT/V SUB Adjustment (CD-55 Board/VC-87 Board)

Note : The PG CONT specification voltage and the V SUB specification voltage are indicated in two characters (the first for PG CONT and the second for V SUB) on the CCD imager as shown below.

CD-55 BOARD (COMPONENT SIDE)



• PG CONT Adjustment

PG voltage conversion table	
Integer symbol	Voltage [V]
1	1.0
2	1.5
3	2.0
4	2.5
5	3.0
6	3.5
7	4.0

• V SUB Adjustment

V SUB voltage conversion table			
Integer symbol	Voltage [V]	Integer symbol	Voltage [V]
E	9.0	Q	14.0
F	9.5	R	14.5
G	10.0	S	15.0
H	10.5	T	15.5
J	11.0	U	16.0
K	11.5	V	16.5
L	12.0	W	17.0
M	12.5	X	17.5
N	13.0	Y	18.0
P	13.5	Z	18.5

A. PG CONT Adjustment

Object	No required
Measurement Point	Checkpoint array pin ② (PG CONT)
Measuring instrument	Digital voltmeter
Adjustment page	F
Adjustment address	13 (PG CONT)
Specified value	(CCD imager indicated voltage)±0.1Vdc

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00, and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 13 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control to obtain (CCD imager indicated value)±0.1Vdc.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

B. V SUB Adjustment

Object	No required
Measurement Point	Checkpoint array pin ③ (V SUB)
Measuring instrument	Digital voltmeter
Adjustment page	F
Adjustment address	12 (V SUB)
Specified value	(CCD imager indicated voltage) ± 3%

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00, and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 12 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control to obtain (CCD imager indicated value)±3%.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

Fig. 4-11.

4-3-5. Sync Level Adjustment (VC-87 Board)

Object	All black (Cover the lens with a black cap.)
Measurement point	Checkpoint array pin (A8)(CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	16 (SYNC LEVEL)
Specified value	$140 \pm 5\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00, and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 16 with the adjustment remote control.
- 4) Change the adjustment data to adjust the sync level to $140 \pm 5\text{mV}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

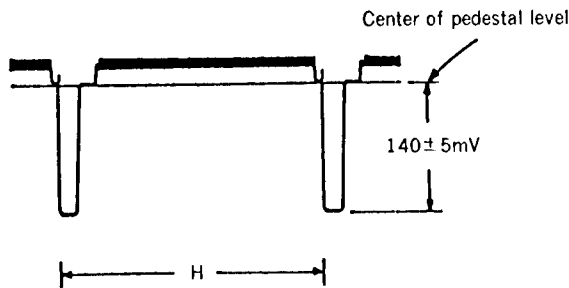


Fig. 4-12.

4-3-6. Setup Adjustment (VC-87 Board)

Object	All black (Cover the lens with a black cap.)
Measurement point	Checkpoint array pin (A8)(CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	10 (SET UP) 18 (MAX GAIN)
Specified value	$15 \pm 5\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 18 with the adjustment remote control. Make a note of the adjustment data for this address (as data F), then preset the adjustment data to 00. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Select adjustment address 10 with the adjustment remote control.
- 5) Change the adjustment data to adjust the setup level to $15 \pm 5\text{mV}$. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Select adjustment address 18 and input the data F.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

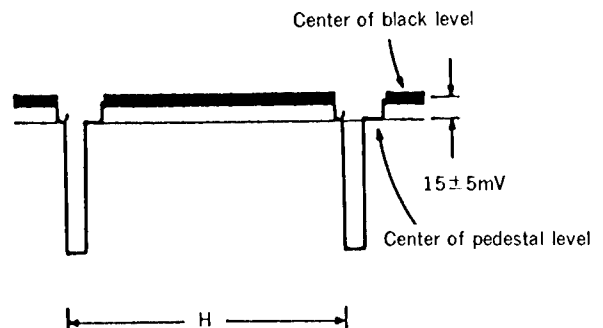


Fig. 4-13.

4-3-7. Iris Adjustment (VC-87 Board)

Object	Color bar chart standard picture frame
Filter	ND filters 0.5
Measurement point	Checkpoint array pin ⑬ (IRIS OUT)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	19 (IRIS REF)
Specified value	$150 \pm 5 \text{ mVp-p}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 19 with the adjustment remote control.
- 4) With no ND filter attached, change the adjustment data to adjust the IRIS OUT signal level to $150 \pm 5 \text{ mVp-p}$ with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 5) Attach the ND filter 0.5 in front of the lens and confirm that the signal level changes smoothly.
- 6) Remove the ND filter and check that the signal level is at $150 \pm 10 \text{ mVp-p}$.
- 7) If the specification is not met, repeat Steps 4) to 6).
- 8) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

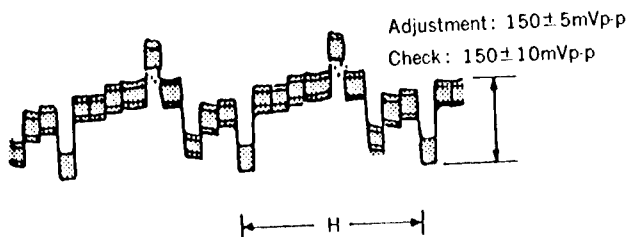


Fig. 4-14.

4-3-8. AGC Adjustment (VC-87 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin ⑬ (Y LPF OUT)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	1A (AGC REF)
Specified value	$180 \pm 5 \text{ mV}$

Note: If there is significant noise, insert a $5.6 \text{ k}\Omega$ resistance for measurement.

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 1A with the adjustment remote control.
- 4) Change the adjustment data to adjust the signal level to $180 \pm 5 \text{ mVp-p}$ with the adjustment remote control.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

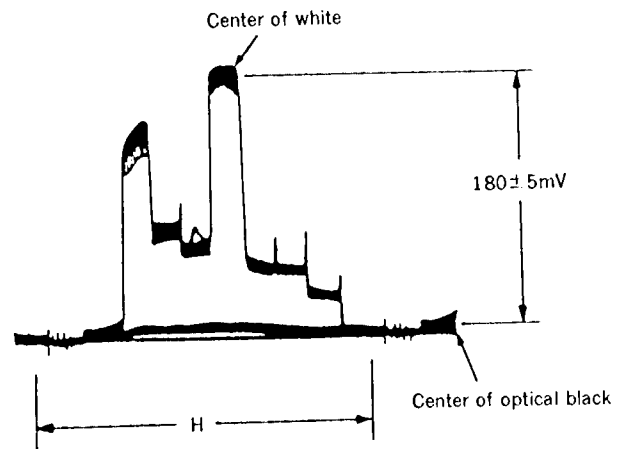


Fig. 4-15.

4-3-9. Matrix Adjustment

(1) Y₁ Gain Adjustment (VC-87 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (A5)(VAP OUT)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	07 (Y ₁ GAIN)
Specified value	0±5mV

[Preparation]

- 1) Short the checkpoint array pin (B8)(Y₂ GAIN) and pin (B5)(VAP SLICE) with GND.

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 0F and preset the adjustment data to 00 (VAP GAIN: MAX) with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Select adjustment address 07 with the adjustment remote control.
- 5) Change the adjustment data with the adjustment remote control and adjust so that the waveform output is a straight line (there should be no difference: 0±5mV).
- 6) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 7) Open the checkpoint array pin (B8) and pin (B5).

Note: After this adjustment, remember to perform Matrix Adjustment (2) Y₂ Gain Adjustment.

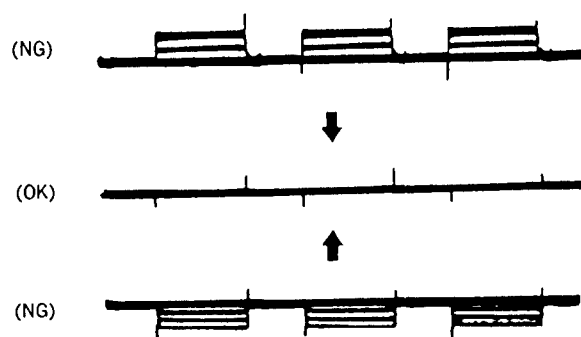


Fig. 4-16.

(2) Y₂ Gain Adjustment (VC-87 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (A5)(VAP OUT)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	06 (Y ₂ GAIN)
Specified value	0±5mV

[Preparation]

- 1) Short the checkpoint array pin (B5)(VAP SLICE) with GND.

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 0F and preset the adjustment data to 00 (VAP GAIN: MAX) with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Select adjustment address 06 with the adjustment remote control.
- 5) Change the adjustment data with the adjustment remote control and adjust so that the waveform output is a straight line (there should be no difference: 0±5mV). Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Select adjustment address 0F and set the adjustment data to 90 with the adjustment remote control.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 8) Open the checkpoint array pin (B5).

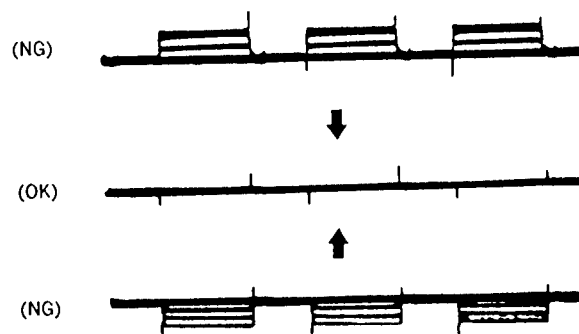


Fig. 4-17.

(3) C₁ Gain Adjustment

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array (A10) pin (CAM C) (IC254 pin (1) and pin (47))
Measuring instrument	Vectorscope Oscilloscope
Adjustment page	F
Adjustment address	03 (C ₁ GAIN)
Specified value	Reduce the bright point split to the minimum level. (• Cyan, green 2.0mm max) (• Magenta 1.0mm max) (• Others 0.5mm max)

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 03 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust so that the bright point of each color is completely focused on one point within the specified value.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

When a vectorscope is used:

Specified value: Cyan } 2.0mm max
 Green }
 Magenta 1.0mm max
 Others 0.5mm max

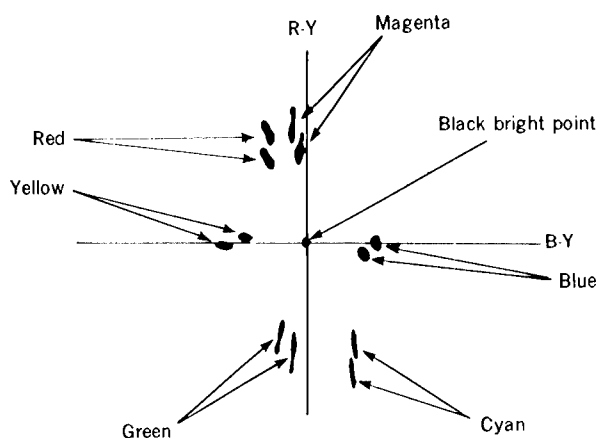


Fig. 4-18.

4-3-10. Y_H Level Adjustment (VC-87 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (A6)(TP)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	08 (Y _H GAIN)
Specified value	0±5mV

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 08 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust so that the waveform output is a straight line (there should be no difference: 0±5mV).
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

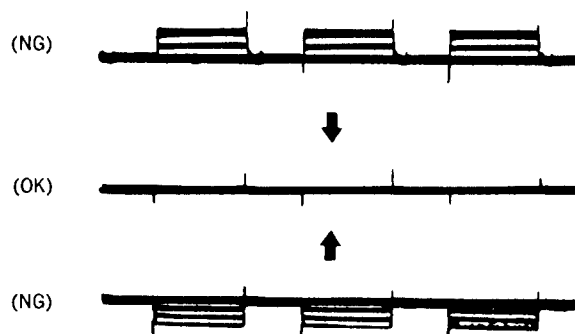


Fig. 4-19.

4-3-11. Chroma Level Adjustment (VC-87 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (A7)(WB-G)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	11 (C LEVEL)
Specified value	$320 \pm 20\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 11 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust the white level to $320 \pm 20\text{mV}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

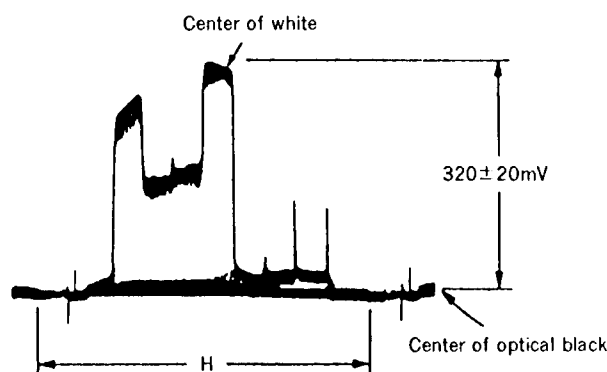


Fig. 4-20.

4-3-12. White Clip Adjustment (VC-87 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (A8)(CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	15 (WHITE CLIP) 0E (Y LEVEL)
Specified value	$420 \pm 10\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 0E and make a note of the adjustment data for this address (this data is treated as data G), then preset the adjustment data to FF with the remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Select adjustment address 15 with the adjustment remote control.
- 5) Change the adjustment data with the adjustment remote control and adjust the white clip level to $420 \pm 10\text{mV}$. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Select adjustment address 0E and input the data G with the adjustment remote control.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

Note : After this adjustment, remember to perform Y Level Adjustment.

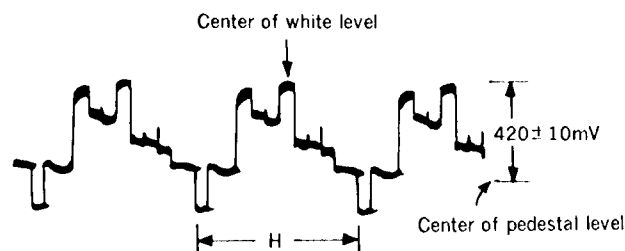


Fig. 4-21.

4-3-13. Y Level Adjustment (VC-87 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (A8)(CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	0E (Y LEVEL)
Specified value	$330 \pm 5\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 0E with the adjustment remote control.
- 4) Change the adjustment data to adjust the Y level to $330 \pm 5\text{mV}$ with the adjustment remote control.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

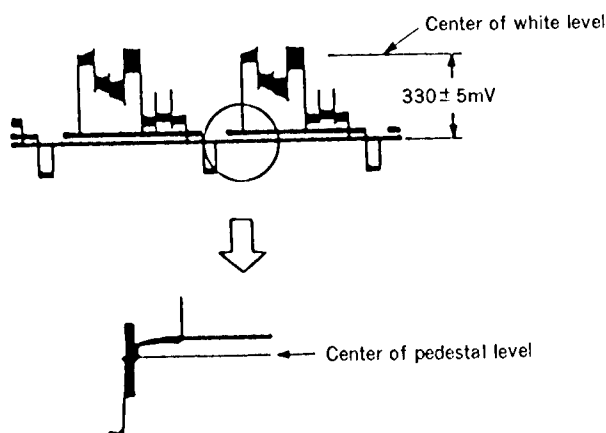


Fig. 4-22.

4-3-14. Max Gain Adjustment (VC-87 Board)

Object	Color bar chart standard picture frame
Filter	ND filter 2.8 (1.0 + 1.0 + 0.4 + 0.4)
Measurement point	Checkpoint array pin (A8)(CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	18 (MAX GAIN)
Specified value	$100 \pm 5\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Cover the lens with the ND filter 2.8 (1.0 + 1.0 + 0.4 + 0.4).
- 3) Select adjustment page F with the adjustment remote control.
- 4) Select adjustment address 18 with the adjustment remote control.
- 5) Change the adjustment data to adjust the level to $100 \pm 5\text{mV}$ with the adjustment remote control.
- 6) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 7) After this adjustment, remove the ND filter 2.8.

Note: The ND filter 2.8 is prepared by combining four filters. However, if the ND filter 2.8 is prepared by combining your three or less filters, use your filter combination.

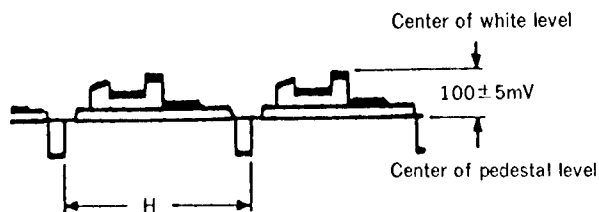


Fig. 4-23.

4-3-15. H Aperture Adjustment (VC-87 Board)

Object	Color bar chart standard picture frame
Measurement point	Checkpoint array pin (A8)(CAM Y)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	0D (SHP LEVEL)
Specified value	$40 \pm 5\text{mV}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Turn the FOCUS RING until the aperture level (waveform peak) is maximized.
- 4) Select adjustment address 0D with the adjustment remote control.
- 5) Change the adjustment data with the adjustment remote control and set the lower peak between "green" and "white" levels to a point $40 \pm 5\text{mV}$ from the pedestal level.
- 6) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

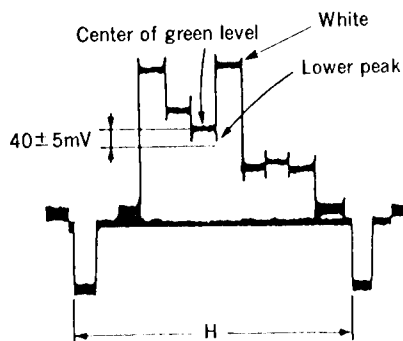


Fig. 4-24.

4-3-16. Burst Level Adjustment (VC-87 Board)

Object	All black (Cover the lens with a black cap.)
Measurement point	Checkpoint array pin (A10)(CAM C)
Measuring instrument	Oscilloscope
Adjustment page	F
Adjustment address	17 (BURST LEVEL)
Specified value	$140 \pm 5\text{mVp-p}$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address 17 with the adjustment remote control.
- 4) Change the adjustment data to adjust the burst level to $140 \pm 5\text{mVp-p}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

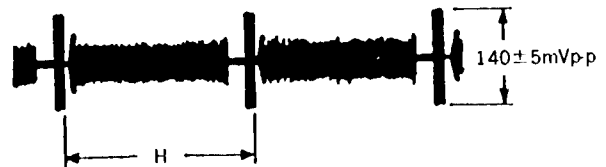


Fig. 4-25.

4-3-17. Pre-white Balance Adjustment

Object	All white standard picture frame
Measurement point	VIDEO OUT terminal of the video block
Measuring instrument	Vectorscope
Adjustment page	F
Adjustment address	05 (R GAIN) 04 (B GAIN)
Specified value	The center of a white bright point must be within a circle of 1mm diameter which is centered at the origin.

[Adjustment Method]

- 1) Maximize the gain of a vectorscope.
- 2) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 3) Select adjustment page F with the adjustment remote control.
- 4) Select adjustment address 05 with the adjustment remote control.
- 5) Change the adjustment data with the adjustment remote control to allow the white bright point to coincide with the origin.
Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Select adjustment address 04.
- 7) Change the adjustment data with the adjustment remote control to allow the white bright point to coincide with the origin.
Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 8) Repeat Steps 4) to 7).
- 9) Return the gain of the vectorscope to CAL and make sure that the center of the bright point is within a circle of 1 mm diameter which is centered at the origin.
- 10) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

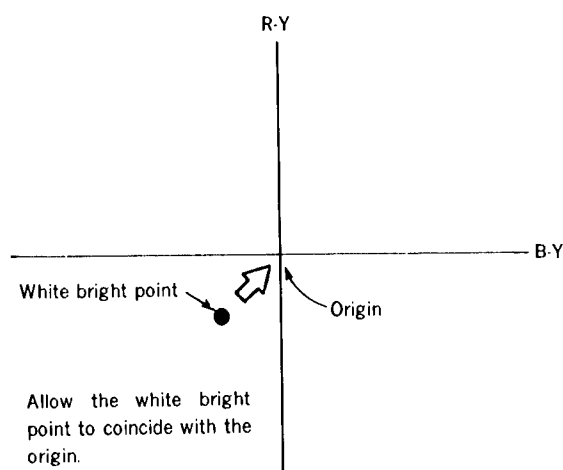


Fig. 4-26.

4-3-18. Color Reproducibility Adjustment

Object	Color bar chart standard picture frame
Measurement point	VIDEO OUT terminal of the video block
Measuring instrument	Vectorscope
Adjustment page	F
Adjustment address	09 (R-Y GAIN) 0A (B-Y GAIN) 0B (R-Y HUE) 0C (B-Y HUE)
Specified value	Every color bright point must be within the color reproduction frame.

Note: This adjustment assumes that both "Burst Level Adjustment" and "Pre-White Balance Adjustmet" have been previously completed.

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Change the adjustment data for each adjustment address with the adjustment remote control to allow every color bright point to fall within the specified color reproduction frame.
- 4) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

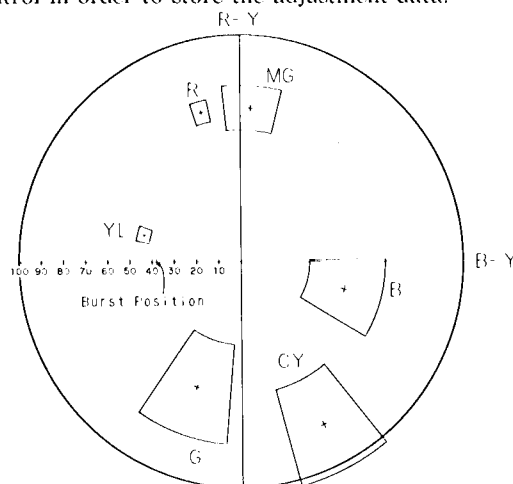


Fig. 4-27.

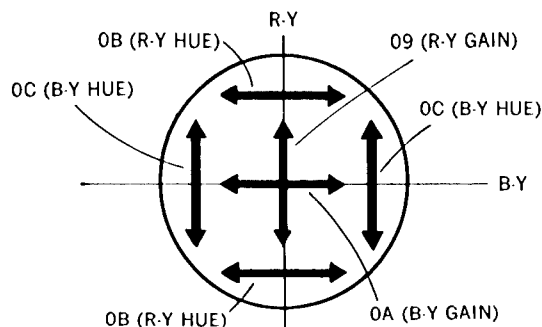


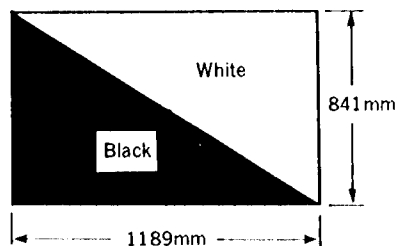
Fig. 4-28. Adjustment Address and Directions of Bright Point Movements

4-3-19. Flange Back Adjustment and Check

(1) Flange Back Adjustment

Object	See Fig. 4-29.
Measurement point	AF microcomputer data reader jig Adjustment remote control
Measuring instrument	
Adjustment page	F
Adjustment address	EB (MODE) E9 (ADJUST MODE)
Specified value	The adjustment remote control must indicate adjustment address 3B.

Note : The following object should be used
(A0 size 1189×841mm)



Size of A0

The border between black and white parts should be sharp. Also, there should be no background except for this chart at the extreme end of WIDE.

Fig. 4-29.

[Adjustment Method]

- 1) Place the specified object in the center of the screen 2 meters±5mm apart from the front of the lens.
- 2) Make sure that the change between white and black is not deviated from the center of the screen even at the extreme end of TELE.
- 3) Press the SHUTTER SPEED button and set the speed to 1/100 shutter.
- 4) Select adjustment page 5, adjustment address 00 and adjustment data F0 with the adjustment remote control.
- 5) Select adjustment page F, adjustment address EB and adjustment data F9 with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Attach an appropriate ND filter on the whole lens depending on the quantity of light so that the indicated value of AF microcomputer reader jig is A0 or less.
- 7) Select adjustment address EB and adjustment data 22 with the adjustment remote control.
- 8) Set to adjustment address E9 and adjustment data 0F with the adjustment remote control. (This permits automatic adjustment.)
- 9) After this setting, check that 3B will be displayed at adjustment address on the adjustment remote control for 12 to 18 seconds.
- 10) After this check, remove the ND filter on the lens.
- 11) Select adjustment address EB and adjustment data 00 with the adjustment remote control.
- 12) Select adjustment address E9 and adjustment data 00 with the adjustment remote control.
- 13) Turn the main power OFF.

(2) Flange Back Check

Object	Siemens star chart
Measurement point	VIDEO OUT terminal of the video block
Measuring instrument	Monitor
Specified value	The siemens star must be in focus during zooming. In case of NG: Step difference ± 3 steps max

[Checking Method]

- 1) Place siemens star chart 2m apart from the front of the lens.
- 2) Select adjustment page 5, adjustment address 00 and adjustment data 10 with the adjustment remote control.
- 3) Open the IRIS.
- 4) Press the FOCUS button and set to Manual.
- 5) Pick up the image of the siemens star at the extreme end of TELE.
- 6) Turn the FOCUS RING to focus on the center position.
- 7) Check that the siemens star chart is in focus when zooming to the extreme end of WIDE. If NG, perform Steps 8) to 11) given below.
- 8) If NG, memorize the focus steps at the extreme end of WIDE.
- 9) Pick up image at the extreme end of WIDE.
- 10) Turn the FOCUS RING to focus on the center position.
- 11) Check that the focus steps observed at this time are different from the steps memorized above within ± 3 steps.
- 12) After this check, select adjustment page F and adjustment address 56 with the adjustment remote control and check that the adjustment data is 00. If the adjustment data is not 00, set the data to 00. Then, press the PAUSE button on the adjustment remote control to store the adjustment data.

4-3-20. Hall Adjustment (VC-87 Board)

Object	White patten standard frame All black (Put a black cap on the lens.)
Measurement point	CN251
Measuring instrument	AF microcomputer data reader jig
Adjustment page	F
Adjustment address	1B (HALL GAIN) 1C (HALL OFFEST)
Specified value	White pattern imaging: $AC \pm 02$ All black imaging: 03 ± 03 (However, 00 is considered NG.)

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select the adjustment page F with the adjustment remote control.
- 3) Set the adjustment address to EB and the adjustment data to 05 with the adjustment remote control.
- 4) Press the PAUSE button on the adjustment remote control.
- 5) Set the adjustment address to 1B with the adjustment remote control.
Pick up the image of all white pattern in the zoom position of color bar standard frame. Change the adjustment data and adjust so that the indicated value of AF microcomputer reader jig is $AC \pm 02$. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
Put a black cap on the lens and select all black imaging. Change the adjustment data and adjust so that the indicated value of AF microcomputer reader jig is 03 ± 03 (however, 00 is considered NG). Press the PAUSE button on the adjustment remote control to store the adjustment data.
- 6) Set the adjustment address to 1C with the adjustment remote control.
Pick up the image of all white pattern in the zoom position of color bar standard frame. Change the adjustment data and adjust so that the indicated value of the AF microcomputer reader jig is $AC \pm 02$. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
Put a black cap on the lens and select all black imaging. Change the adjustment data and adjust so that the indicated value of AF microcomputer reader jig is 03 ± 03 (however, 00 is considered NG). Press the PAUSE button on the adjustment remote control to store the adjustment data.
- 7) Repeat Steps 5) and 6) alternately until the specification is met.
- 8) Set the adjustment address to EB and the adjustment data to 00 with the adjustment remote control.
- 9) Press the PAUSE button on the adjustment remote control to store the adjustment data.

4-3-21. Auto White Balance Adjustment (VC-87 Board)

Note 1: "Preset Adjustment" and "Auto White Balance Adjustment" should be always performed in this order.

1) Preset Adjustment (VC-87 Board)

Object	All white pattern
Adjustment page	F
Adjustment address	EE (AWB MODE1)

Note 1: Allow the set to be energized for more than 30 seconds before entering Preset Adjustment.

Note 2: When making "Preset Adjustment" again, turn the power OFF once and then ON again before retry.

[Adjustment Method]

- 1) Turn the power OFF once and then ON again.
- 2) Pick up the image of all white pattern for more than 5 seconds. (AF switch should be turned OFF.)
- 3) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 4) Select adjustment page F with the adjustment remote control.
- 5) Set the adjustment address to EE and the adjustment data to 01 with the adjustment remote control.
- 6) Press the PAUSE button on the adjustment remote control (3200K Data Fetch 1).
- 7) Set the adjustment address to EE and the adjustment data to 01 with the adjustment remote control.
- 8) Press the PAUSE button on the adjustment remote control (3200K Data Fetch 2).
- 9) Check that the LANC data is changed and that adjustment address 95 is selected.
- 10) Set the adjustment address to EE and the adjustment data to 00 with the adjustment remote control.
- 11) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 12) Perform "Auto White Balance Adjustment."

(2) Auto White Balance Adjustment (VC-87 Board)

Note 1: This adjustment assumes that "Preset Adjustment" has been previously completed.

Object	All white pattern
Filter	Color temperature compensation filter C14 (C12+ C2)
Measuring instrument	Vectorscope
Measurement point	VIDEO OUT terminal
Adjustment page	F
Adjustment address	01 (R CONT) 02 (B CONT)
Specified value	The white bright point must coincide with the origin.

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Cover the lens with the C14 filter.
- 3) Select adjustment page F with the adjustment remote control.
- 4) Select adjustment address EE (AWB MODE1) and set the adjustment data to D0 (WB DIRECT setting) with the adjustment remote control. Press the PAUSE button adjustment remote control in order to store the adjustment data.
- 5) Change the adjustment data at adjustment addresses 01 and 02 and adjust so that the white bright point coincides with the origin. Press the PAUSE button on the adjustment remote control to store the adjustment data.
- 6) Select adjustment address EE and set the adjustment data to 00.
- 7) Press the PAUSE button on the adjustment remote control to store the adjustment data.

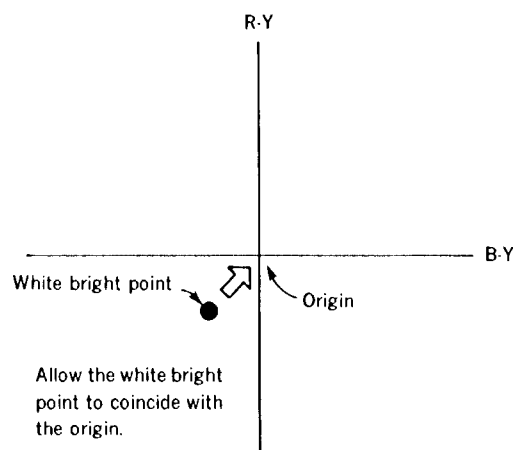


Fig. 4-30.

4-3-22. Manual Gain Reference Setting (VC-87 Board)

Object	Color bar chart standard picture frame
Measurement point	CN251
Measuring instrument	AF microcomputer data reader jig
Adjustment page	F
Adjustment address	64 (GAIN REF)

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address EB and adjustment data 0B with the adjustment remote control.
- 4) At this time, input the indicated value of AF microcomputer reader jig to address 64. Press the PAUSE button in order to store the adjustment data.
- 5) Select adjustment address EB and adjustment data 00.
- 6) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

4-3-23. Manual Iris Data Adjustment (VC-87 Board)

Object	White pattern standard picture frame
Measurement point	CN251
Measuring instrument	AF microcomputer data reader jig
Adjustment page	F
Adjustment address	63 (M IRIS REF)
Specified value	$AC \pm 02$

[Adjustment Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 2) Select adjustment page F with the adjustment remote control.
- 3) Select adjustment address EB and adjustment data 05 with the adjustment remote control.
- 4) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 5) Open the AUTO LOCK cover.
- 6) Press the EXPOSURE button and set to Brightness mode.
Use the EXPOSURE control dial to set to the 8th position from the bottom. (The first position is to be selected when the Iris is closed.)
- 7) Change the adjustment data at adjustment address 63 and adjust so that the indicated value of AF microcomputer reader jig is $AC \pm 02$. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 8) Select adjustment address EB and adjustment data 00.
- 9) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

4-3-24. Outdoor White Balance Check

Object	All white pattern standard frame
Filter	Color temperature compensation filter C14 (C12+ C2)
Measurement point	VIDEO OUT terminal of the video block
Measuring instrument	Vectorscope
Specified value	See Fig. 4-31.

[Checking Method]

- 1) Press the WHITE BALANCE button and set to Outdoor White Balance mode.
(The mark  will appear on the EVF screen or monitor screen (when the data screen is turned ON).)
- 2) Check that the center of the white bright point is within the circle of 3.5mm diameter given in Fig. 4-31.

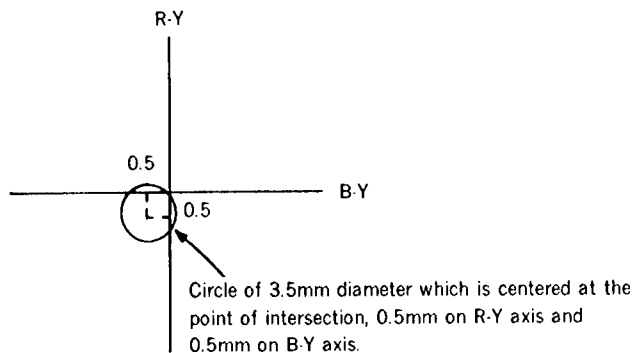


Fig. 4-31.

4-3-25. Auto Focus Check (VC-87 Board)

Object	Color bar chart standard picture frame
Measurement point	CN251
Measuring instrument	AF microcomputer reader jig
Adjustment page	F
Adjustment address	EB (MODE) 5D (JIG 1 PAGE) 40 (JIG 0)
Specified value	FA > 60 FA/FH = 3 or 4

[Checking Method]

- 1) Press the FOCUS button and turn the Auto Focus ON.
- 2) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 3) Select adjustment page F, adjustment address EB and adjustment data F9 with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Check that the indicated value (FA) of AF microcomputer reader jig is more than 60 (FA > 60).
- 5) After this check, set the adjustment data at adjustment address EB to 21. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Select adjustment address 5D and adjustment data 00 with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 7) Select adjustment address 40 and adjustment data D4 with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 8) Check that the indicated value (FA/FH) of AF microcomputer reader jig is 3 or 4 (FA/FH = 3 or 4).
- 9) After this check, set to adjustment address EB and adjustment data 00.
- 10) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

4-3-26. Brightness Correction Check (VC-87 Board)

Object	All white pattern All black (Cover the lens with a black cap.)
Measurement point	CN251
Measuring instrument	AF microcomputer reader jig
Adjustment page	F
Adjustment address	EB (MODE)
Specified value	All white and all black : $AC \pm 03$ Resetting : 04 ± 03

[Checking Method]

- 1) Take a picture of all white pattern and set the EXPOSURE button to ON.
- 2) Select adjustment page 5, adjustment address 00 and adjustment data 80 with the adjustment remote control.
- 3) Select adjustment page F, adjustment address EB and adjustment data 05 with the adjustment remote control. Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 4) Check that the indicated value of AF microcomputer reader jig is $AC \pm 03$.
- 5) Make all black imaging (Cover the lens with a black cap).
- 6) Check that the indicated value of AF microcomputer reader jig is still $AC \pm 03$.
- 7) Set the EXPOSURE button to OFF and then to ON again.
- 8) Check that the indicated value of AF microcomputer reader jig is 04 ± 03 . Also, check that the EVF brightness indication is at the top.
- 9) Set to adjustment address EB and adjustment data 00 with the adjustment remote control.
- 10) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

4-3-27. Digital Titler Picture Quality Check

Mode	Camera Stand-by
Object	All black (Cover the lens with a black cap.)
Measurement point	VIDEO OUT terminal
Measuring instrument	Vectorscope
Specified value	Mg (Magenta) must be within the specified frame. (Check that each of the other colors is within the specified frame.)

[Checking Method]

- 1) Select adjustment page 5, adjustment address 00 and adjustment data 10 with the adjustment remote control.
- 2) Make all black imaging (Cover the lens with a black cap).
- 3) Press the MEMORY button.
- 4) Press the SUPERIMPOSE ON/OFF button to display the title.
- 5) Press the COLOR/MODE button to select Mg (Magenta).
- 6) At this time, check that Magenta is within the specified frame.
- 7) Check that each of the other colors is within the specified frame.

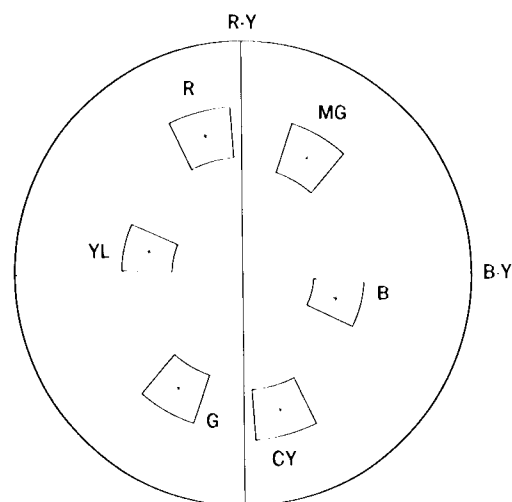


Fig. 4-32.

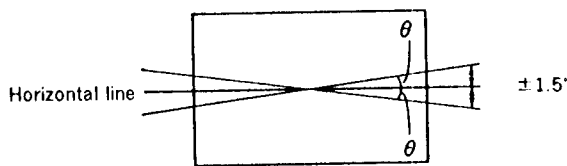
4-4. ELECTRONIC VIEWFINDER SYSTEM ADJUSTMENTS

4-4-1. Horizontal Tilt Adjustment

Mode	Playback
Signal	Alignment tape for checking operation (WR5-4NSP) Monoscope portion
Specified value	See Fig. 4-33

[Adjustment Method]

- 1) Adjust optimum brightness on the CRT with RV954 (BRIGHT).
- 2) Loosen the DY (deflection yoke) tightening nut.
- 3) Make the picture horizontal by rotating DY.
- 4) Retighten the DY tightening nut.
(Do not tighten excessively.)



Specified value: Image orientation to be within $\pm 1.5^\circ$ of horizontal line.

Fig. 4-33.

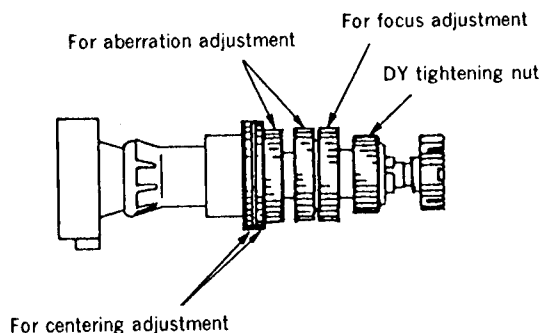


Fig. 4-34.

4-4-2. Centering Adjustment

Mode	Playback
Signal	Alignment tape for checking operation (WR5-4NSP) Monoscope portion
Specified value	See Fig. 4-35.

[Adjustment Method]

- 1) Turn the centering adjustment rings to make the margin even at right, left, upper and lower of the screen.
(See Fig. 4-34.)

Note : Since the centering position is affected by the earth magnetism, turn the equipment over 360° horizontally, and make adjustment at the orientation that exhibits median displacements of the image.

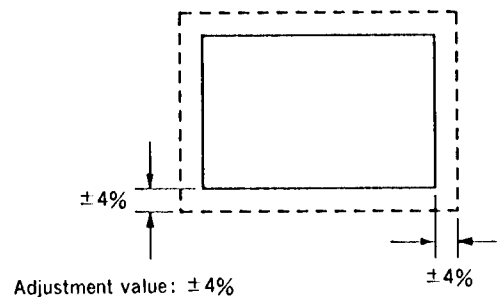


Fig. 4-35.

4-4-3. Focus Adjustment

Mode	Playback
Signal	Alignment tape for checking operation (WR5-4NSP) Monoscope portion

[Adjustment Method]

- 1) Adjust for optimum focus using the focus ring.
(See Fig. 4-34.)

4-4-4. Aberration Adjustment

Mode	E-E
Signal	Dot pattern
Specified value	See Fig. 4-36.

[Adjustment Method]

- 1) Use the aberration adjustment rings to adjust any trailing dots to under 2 times the dot diameter and any fan shaped aberrations to within the dot diameter.
- 2) If off center, repeat the "Centering Adjustment".

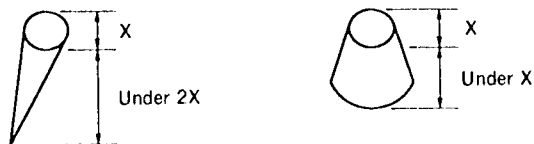


Fig. 4-36.

4-4-5. Horizontal Oscillation Frequency Adjustment (VF-4U Board)

Mode	Playback
Signal	Alignment tape for checking operation (WR5-4NSP)
Measurement point	Positive terminal of C954
Measuring instrument	Digital voltmeter or oscilloscope (DC range)
Adjustment element	RV951
Specified value	$2.60 \pm 0.05 \text{Vdc}$

[Adjustment Method]

- 1) Adjust RV951 to $2.60 \pm 0.05 \text{Vdc}$.

4-4-6. Horizontal Amplitude Adjustment (VF-40 Board)

Mode	Playback
Signal	Alignment tape for checking operation (WR5-4NSP) Monoscope portion
Adjustment element	C961
Specified value	$6 \pm 2\%$

[Adjustment Method]

- 1) By turning RV952, align upper and lower edges of the monoscope image with those of the screen.
- 2) By turning RV954, attain a normal brightness level.
- 3) To achieve $6 \pm 2\%$ horizontal overscans (right and left total), short-circuit or open the pattern (A) for H size adjustment capacitor (C961). (See Fig. 4-38.)

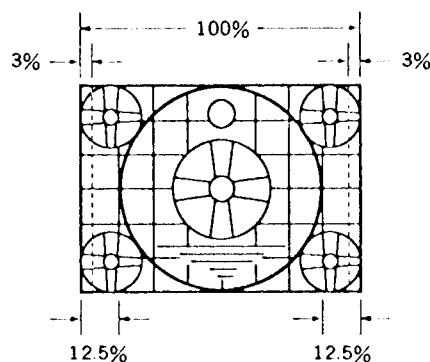
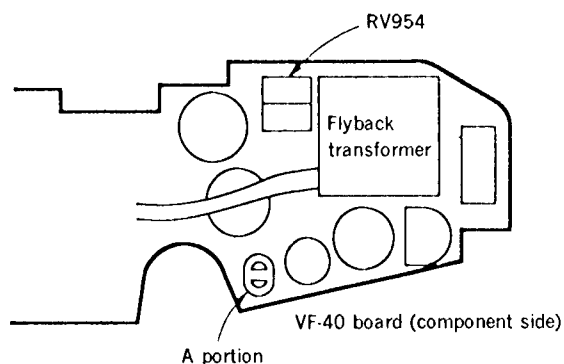


Fig. 4-37.



A section	H size
Open	Small
Short	Large

Fig. 4-38.

4-4-7. Vertical Amplitude Adjustment (VF-40 Board)

Mode	Playback
Signal	Alignment tape for checking operation (WR5-4NSP) Monoscope portion
Adjustment element	RV952
Specified value	$5 \pm 2\%$

[Adjustment Method]

- 1) By turning RV952, adjust for $5 \pm 2\%$ (upper and lower total) vertical overscan.

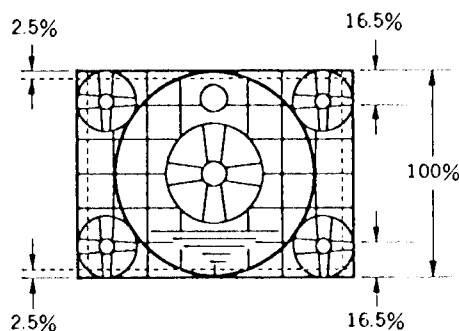


Fig. 4-39.

4-4-8. Brightness, Contrast Adjustments (VF-40 Board)

Mode	Playback
Signal	Alignment tape for checking operation (WR5-4NSP) Monoscope portion
Adjustment element	Brightness : RV954 Contrast : RV953

[Adjustment Method]

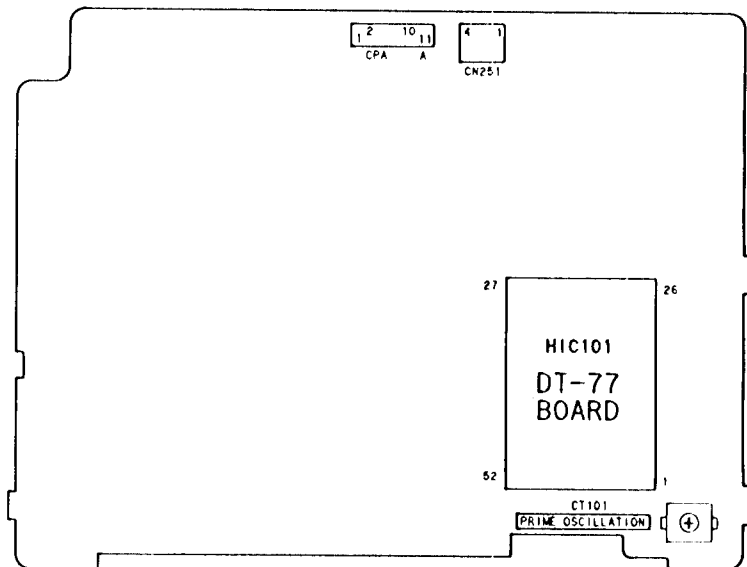
- 1) Turn RV954 and RV953 alternately until the bright and dark areas of a gray scale are displayed correctly. (The bright areas should not be made too bright to avoid a fuzzy display of the cross-hatches in the monoscope circle, and the brightness of the dark areas should be such that discrimination between the darkest and second darkest area is possible.)

4-4-9. Horizontal Amplitude, Vertical Amplitude and Focus Checks

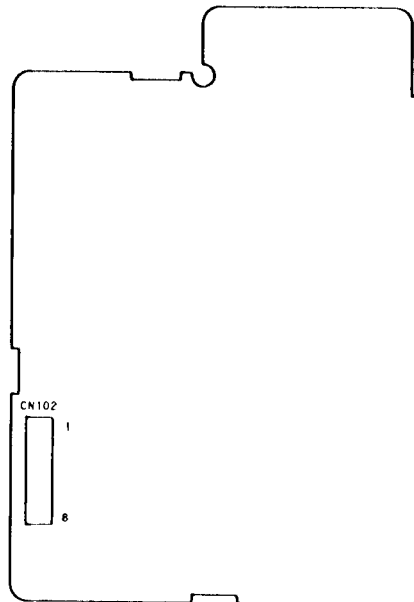
Values should conform to specifications given in "4-4-6. Horizontal Amplitude Adjustment" and "4-4-7. Vertical Amplitude Adjustment". If not, readjust accordingly, and repeat "4-4-8. Brightness, Contrast Adjustments". In this case, focus needs to be checked. If the image is not clear, perform "4-4-3. Focus Adjustment" and "4-4-4. Aberration Adjustment".

4-5. ADJUSTING PART LOCATION DIAGRAM

VC-87 BOARD (COMPONENT SIDE)



DD-33 BOARD
(COMPONENT SIDE)



SECTION 5

VIDEO SYSTEM ADJUSTMENTS

See the adjusting part location diagram from on page 120 for the adjustment

5-1. PREPARATION FOR ADJUSTMENT

5-1-1. Equipment Required

The following measuring instruments are used for adjustment of the VTR block.

- 1) Monitor TV
- 2) Dual-trace oscilloscope, band width of 10MHz or more, with delay mode (use a probe 10 : 1, unless otherwise specified)
- 3) Frequency counter
- 4) Pattern generator (with video output terminal ; refer to 5-1-3 "Equipment Connection")
- 5) Digital voltmeter
- 6) Audio generator
- 7) Audio level meter
- 8) Audio distortion meter
- 9) Audio attenuator
- 10) Stabilized power supply
- 11) Alignment tape
 - For tracking adjustment
(WR5-1NP) Part No. : 8-967-995-02
 - For video frequency characteristic adjustment
(WR5-7NE) Part No. : 8-967-995-13
 - For L mode operation check
 - For SP (WR5-5NSP) Part No. : 8-967-995-42
 - (WR5-4NSP) Part No. : 8-967-995-41
 - For LP (WR5-4NL) Part No. : 8-967-995-51
 - For E mode operation check (ME tape)
 - For SP (WR5-8NSE) Part No. : 8-967-995-43
 - For LP (WR5-8NLE) Part No. : 8-967-995-52
 - For audio adjustment
(WR5-9NS) Part No. : 8-967-995-23

5-1-2. Precautions for Adjustment

"Playback Frequency Characteristic Adjustment" of the Video System Adjustment should be always performed with the VC-87 board removed. When removing the VC-87 board, the following three flexible harnesses (four connectors) should be removed.

1. FP-379 Flexible (Two connectors)
2. FP-380 Flexible
3. FP-383 Flexible

The VC-87 board should be installed for performing the other adjustments for the VTR block.

5-1-3. Equipment Connection

Connect the measuring instruments as shown in Fig. 5-1 in accordance with indication of an input terminal (S VIDEO or VIDEO), and shift the CAMERA/VTR switch to VTR to make adjustment. The input terminal is specified in parentheses at the signal blank. When not specified, either input terminal may be used. The S VIDEO IN terminal has priority. When making adjustment with VIDEO IN terminal input, pull out a connector from the S VIDEO IN terminal.

Note 1 : When VIDEO input is used for adjustment where S VIDEO input is specified, the specifications of this equipment may not be satisfied. Be sure to follow instructions.

Note 2 : When adjustment is made using the VTR with S VIDEO output terminal as a signal source, the performance of this equipment is affected by that VTR. Use the pattern generator with Y/C separator output terminal as much as possible.

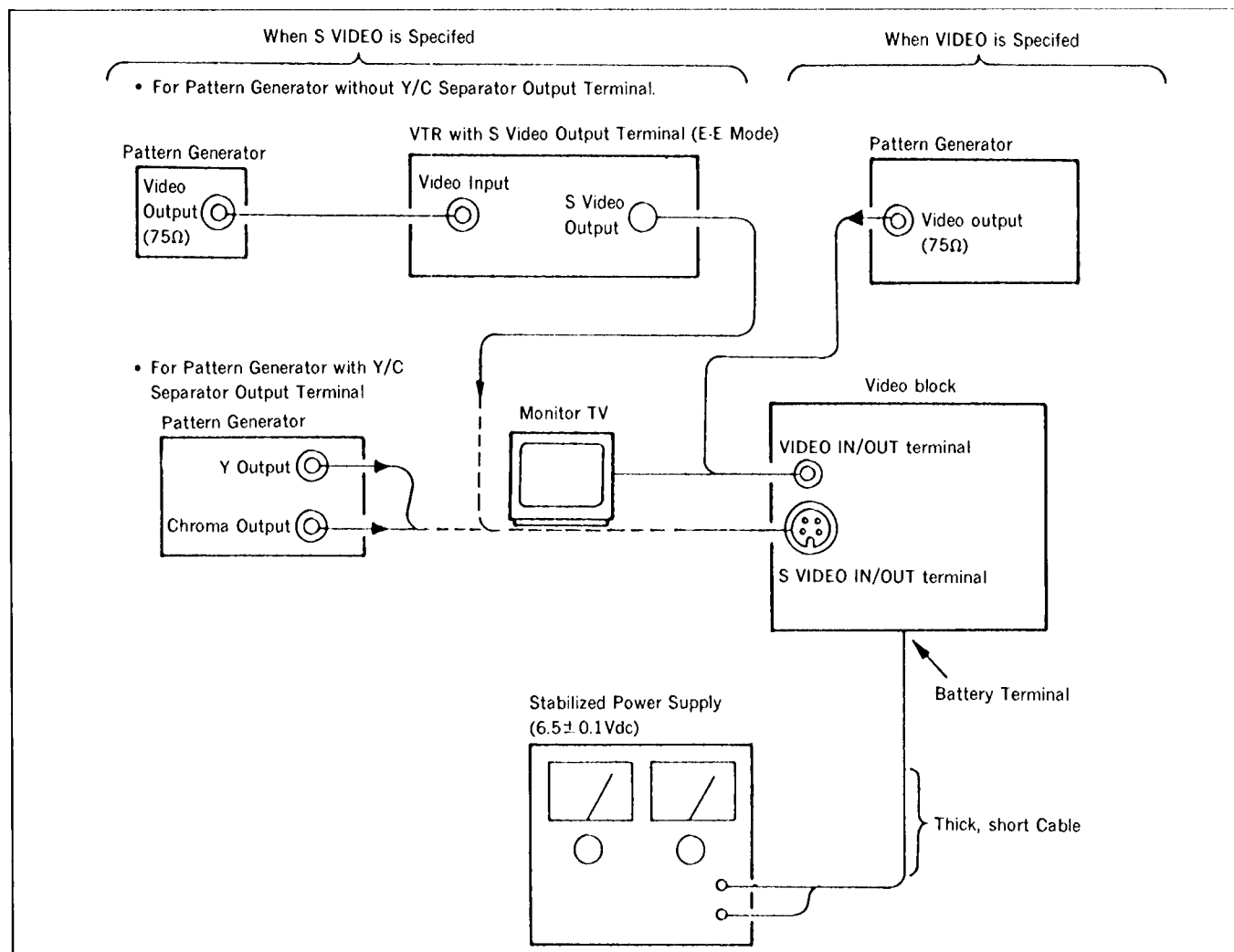


Fig. 5-1.

5-1-4. Input Signal Check

Video signals from the pattern generator are used as adjustment signals for adjustment of the VTR block. These video output signals should be within the required standard.

1) For S VIDEO input

Connect an oscilloscope to the Y signal terminal of the S VIDEO IN terminal and check that a Y signal sync. signal has an amplitude of about 0.3 Vp-p, and an image amplitude is about 0.7 Vp-p. (When the VTR with S VIDEO OUT terminal is used, check also that neither chroma signal nor burst signal is remaining.) Also, connect the oscilloscope to the chroma signal terminal of the S VIDEO IN terminal and check that the burst signal for the chroma signal has a flat amplitude of about 0.3 Vp-p, and that a burst signal vs. chroma signal amplitude ratio is 0.30 : 0.66. Fig. 5-2 shows the Y and chroma signals used for adjustment.

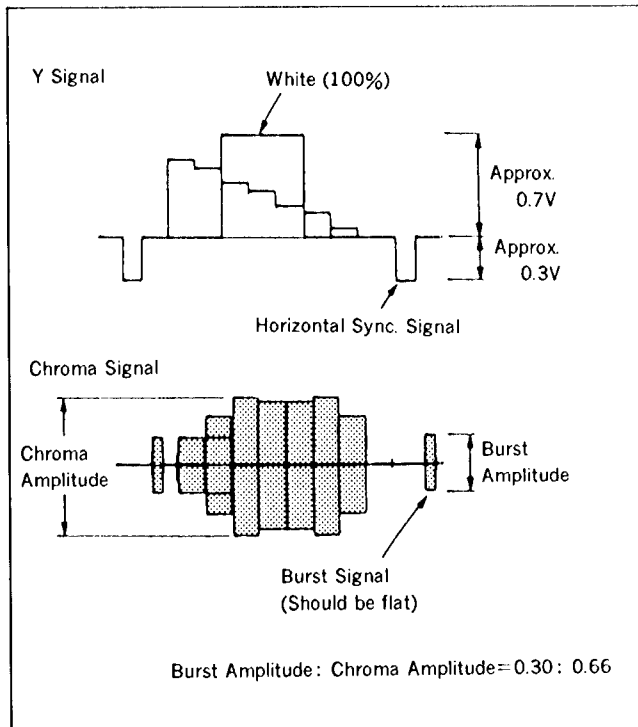


Fig. 5-2. Pattern Generator Color Bar Signals

2) For VIDEO input

Connect the oscilloscope to the VIDEO IN terminal and check that a video signal sync. signal amplitude is approx. 0.3V, image amplitude approx. 0.7V, and burst signal amplitude approx. 0.3V and flat, respectively, and that a burst signal vs. "red" signal level ratio is 0.30 : 0.66.

The video signal (color bar) used for the VTR block adjustment is shown in Fig. 5-3.

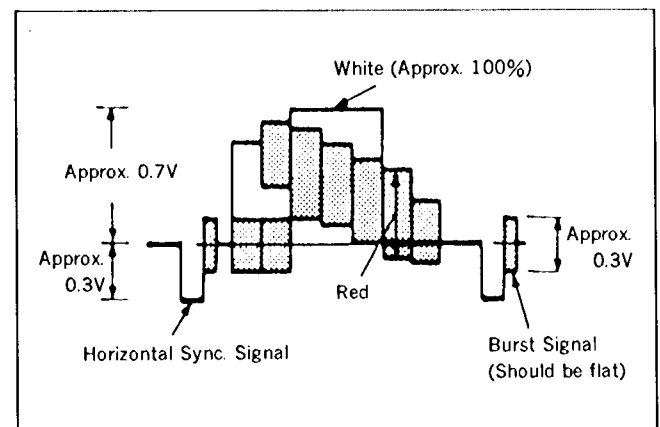


Fig. 5-3. Pattern Generator Color Bar Signal

5-1-5. Alignment Tape

The following alignment tapes are provided. Use the alignment tape specified in the signal blank for each adjustment.

When using the operation checking tape for adjustment and no type is specified, you can use any operation checking tape.

Tape	Recording Mode	Tape Type	Tape Speed	Recording content		Use
				Video Area	PCM Area	
Tracking WR5-1NP	L	MP	SP	CH2 : 1 MHz tape path adjustment signal, Switching position adjustment marker (CH1 : 9MHz)		Tape path adjustment, Switching position adjustment
Video frequency characteristic WR5-7NE	E	ME	SP	RF sweep 0~15MHz Marker 2, 4.5, 7, 8.5, 10MHz		Frequency characteristic adjustment
Operation checking WR5-4NSP or WR5-5NSP	L	MP	SP	- Video signal Color bar : 4min. Monoscope : 4min. - Audio signal (AFM) 400Hz, 60% modulation	Audio signal (PCM) Monoscope portion 20Hz, 20sec. 400Hz, 20sec. 14kHz, 20sec. Color bar portion 1kHz, 4min.	Operation checking
WR5-8NSE	E	ME	SP			
WR5-4NL	L	MP	LP			
WR5-8NLE	E	ME	LP	- Video signal Color bar : 4min. Monoscope : 4min. - Audio signal (AFM) 400Hz, 60% modulation	Audio signal (PCM) 400Hz	AFM stereo operation check
AFM stereo checking operation WR5-9NS (8-967-995-23)	L	MP	SP	- Video signal Color bar : 4minutes Monoscope : 4minutes - Audio signal (AFM) Stereo section (color bar) L ch : 400Hz, R ch : 1kHz L+R : 1.5MHz, ± 60kHz DEV L- R : 1.7MHz, ± 30kHz DEV Bilingual section (monoscope) MAIN : 400Hz (1.5MHz, ± 60kHz DEV) SUB : 1kHz (1.7MHz, ± 30kHz DEV)	Audio signal (PCM) 400Hz : 8minutes	

Note : Recording modes

L Conventional mode
E Hi8 (high band) mode

Tape types

MP Coated metal tape
ME Evaporated metal tape

Fig. 5-4 shows the 75% color bar signal recorded in the alignment tape.

Note : Measure at the VIDEO OUT terminal (terminated at 75 Ω).

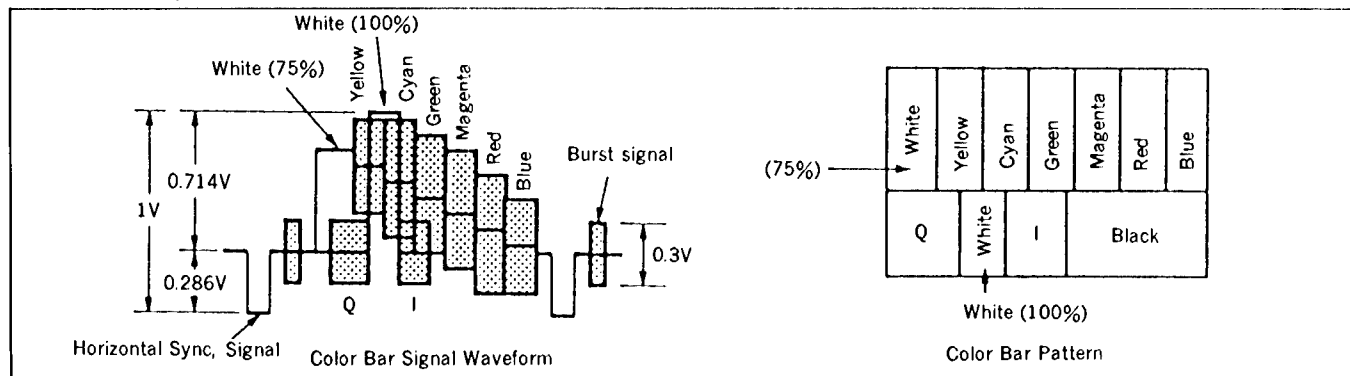


Fig 5-4. Alignment Tape Color Bar Signal

5-1-6. Input/Output Level and Impedance

S video input/output

4-pin mini DIN

Luminance signal : 1 Vp-p, 75

ohms, unbalanced,

sync negative

Chrominance signal : 0.286 Vp-p, 75

ohms, unbalanced,

Video input/output

Phono jack, 1 Vp-p, 75 ohms,

unbalanced, sync negative

Audio input/output

Phono jacks, (2 : stereo L and R)

Input : - 7.5 dBs, input impedance
more than 47 kilohms

Output : - 7.5 dBs, (at output
impedance 47 kilohms) impedance
less than 2.2 kilohms

5-1-7. Recording Mode (E Mode/L Mode) Changeover

The recording mode (E mode/L mode) of this unit is changed over as listed below. Note that the playback mode (E mode/L mode) is automatically changed over depending on the recording mode for the tape to be played back.

Hi8 switch (L mode/E mode changeover switch)	Tape used	Record mode
AUTO (E mode)	ME	E
	MPHG	
	MP	L
OFF (L mode)	ME	
	MPHG	L
	MP	

(The recording mode only depends on the position of the Hi8 switch and the tape used.)

5-2. POWER SUPPLY ADJUSTMENT AND CHECK

[Adjustment Sequence]

- 5-2-1. Frequency Adjustment
- 5-2-2. Video 5V Adjustment
- 5-2-3. Output Voltage Check

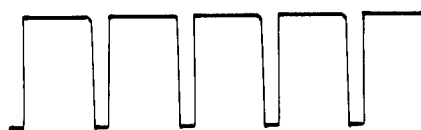
5-2-1. Frequency Adjustment (DD-33 Board)

Mode	Record
Signal	Arbitrary
Measurement point	Q201 collector (JL202)
Measuring instrument	Oscilloscope Frequency counter
Adjustment element	RV101
Specified value	$475 \pm 5 \text{ kHz}$

Note : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Adjustment Method]

- 1) Adjust RV101 to obtain the level $475 \pm 5 \text{ kHz}$.



275 $\pm$ 5 kHz

Fig. 5-5.

5-2-2. Video 5V Adjustment (DD-33 Board)

Mode	Record
Signal	Arbitrary
Measurement point	Positive (+) side : CN103 pin ③ Negative (−) side : CN103 pin ① (REG GND) (JL204)
Measuring instrument	Digital voltmeter
Adjustment element	RV102
Specified value	$4.92 \pm 0.01 \text{ Vdc}$

[Adjustment Method]

- 1) Adjust RV102 to obtain the level $4.92 \pm 0.01 \text{ Vdc}$.

5-2-3. Output Voltage Check (DD-33 Board)

Note : Pin ① of CN103 (REG GND) (JL204) should be used for grounding.

Mode	E-E
Measuring instrument	Digital voltmeter
SS 5V Check	
Measurement point	CN103 pin ⑦ (JL216)
Specified value	$4.91 \pm 0.03 \text{ Vdc}$
VIDEO 5V Check	
Measurement point	CN103 pin ③ (JL207)
Specified value	$4.92 \pm 0.02 \text{ Vdc}$
AUDIO 5V Check	
Measurement point	CN103 pin ⑥ (JL212)
Specified value	$4.89 \pm 0.03 \text{ Vdc}$
EVF 5V Check	
Measurement point	CN103 pin ④ (JL209)
Specified value	$4.95 \pm 0.03 \text{ Vdc}$
V _{EF} Check	
Measurement point	CN103 pin ⑤ (JL210)
Specified value	$- 3.95 \pm 0.10 \text{ Vdc}$

[Checking Method]

- 1) Check that each of the power supply voltages meets its specified value.

5-3. SYSTEM CONTROL SYSTEM ADJUSTMENT

5-3-1. Battery Down Adjustment

Mode	CAMERA REC
Object	Arbitrary
Measurement point	Check on the LCD of the adjustment remote control.
Measuring instrument	
Adjustment page	D
Adjustment address	02

[Connection]

- 1) Connect a stabilized power supply and a digital voltmeter as shown in Fig. 5-6.

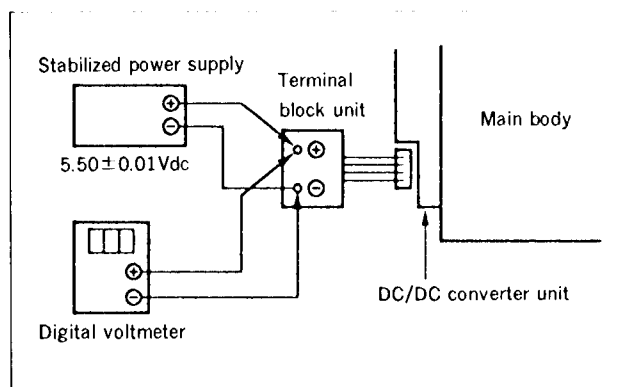


Fig. 5-6.

[Adjustment Method]

- 1) Connect the adjustment remote control to the REMOTE terminal (HL-1 board J501).
- 2) Place the POWER switch in the CAMERA position to set to CAMERA REC mode.
- 3) Place the HOLD switch on the adjustment remote control in the HOLD position (Service position).
- 4) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control (Emergency Inhibited and Protect Released). At this time, check that the voltage is 6.0Vdc or higher.
- 5) Set to adjustment address 02 with the remote control and make a note of the adjustment data (data A).
- 6) Select adjustment page D and adjustment address 02 with the remote control.
- 7) Input the data A noted in Step 5) into at adjustment address 02.
- 8) Press the PAUSE button on the remote control in order to store the adjustment data.

[Checking Method]

Perform the following checks. If any check is NG, perform the adjustment again.

- 1) Adjust the output voltage of the stabilized power supply so that the digital voltmeter indicates $5.65 \pm 0.01 \text{ Vdc}$. (The VTR is in CAMERA REC mode.)
- 2) Check that mark is not illuminating on the EVF (Viewfinder) screen. (The TALLY lamp is lit.)

- 3) Reduce the output voltage of the stabilized power supply to such a level that the digital voltmeter indicates $5.53 \pm 0.01 \text{ Vdc}$.
- 4) Check that mark and TALLY lamp on the EVF screen flashes at approximately 1 sec. intervals.
- 5) Reduce the output voltage of the stabilized power supply to such a level that the digital voltmeter indicates $5.47 \pm 0.01 \text{ Vdc}$.
- 6) Check that mark and TALLY lamp on the EVF screen flashes at more frequent intervals and that the VTR is stopped and that the power is turned OFF.

5-4. SERVO SYSTEM ADJUSTMENT

[Adjustment Sequence]

- 5-4-1. Capstan FG Frequency Check
- 5-4-2. Capstan FG Offset Adjustment
- 5-4-3. Switching Position Adjustment

5-4-1. Capstan FG Frequency Check (VS-76 Board)

Mode	Record (SP) Playback (LP)
Signal	Arbitrary
Measurement point	IC605 pin ⑤ (FG OUT) (J1734)
Measuring instrument	Frequency counter Oscilloscope
Specified value	SP mode : $819.7 \pm 1.0 \text{ Hz}$ LP mode : $410 \pm 1 \text{ Hz}$

[Checking Method]

- 1) Set to Record mode. (SP mode)
- 2) Check that the capstan FG frequency is $819.7 \pm 1.0 \text{ Hz}$.
- 3) Set to Stop mode.
- 4) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 5) Place the EDIT switch in the EDIT ON position.
- 6) Set to Playback mode. (LP mode)
- 7) Check that the capstan FG frequency is $410 \pm 1 \text{ Hz}$.
- 8) Select adjustment page 0 and adjustment address 00 and return the adjustment data to 00 with the adjustment remote control.

5-4-2. Capstan FG Offset Adjustment (VS-76 Board)

Mode	Record
Signal	Arbitrary
Measurement point	IC605 pin ⑤ (FG OUT) (JL734)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	2B
Specified value	Duty $50 \pm 1\%$

[Adjustment Method]

- 1) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 2) Select adjustment page D and adjustment address 2B with the adjustment remote control.
- 3) Change the adjustment data with the adjustment remote control and adjust so that the CAP FG output waveform has a duty of $50 \pm 1\%$.
- 4) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

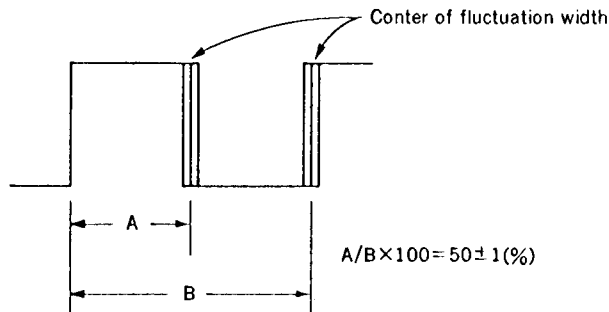


Fig. 5-7.

5-4-3. Switching Position Adjustment (VS-76 Board)

Mode	Playback
Signal	Alignment tape: for tracking adjustment (WR 5-1NP)
Measurement point	CH1: CN002 pin ⑩ (RF SWP) CH2: CN002 pin ⑪ (PB RF 2A) CN002 pin ⑫ (PB RF 2B)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	04
Specified value	$t_1 = 0 \pm 10 \mu\text{sec}$

[Adjustment Method]

- 1) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 2) Select adjustment page D and adjustment address 04 with the adjustment remote control.
- 3) Change the adjustment data with the adjustment remote control and adjust the waveform on CH2 so that $t_1 = 0 \pm 10 \mu\text{sec}$.
- 4) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

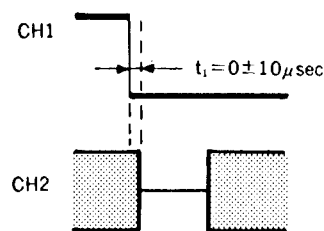


Fig. 5-8.

5-5. VIDEO SYSTEM ADJUSTMENT

It is expected that this Video System Adjustment be performed in the sequence that the adjustments are described. The color video signal supplied from the pattern generator is utilized as the video input signal for this Video System Adjustment in Record mode. Check that the signal meets the specifications given in Fig. 5-3 and in the "Input Signal Check".

[Adjustment Sequence]

- 5-5-1. Playback Frequency Characteristic Adjustment
- 5-5-2. X'tal Oscillator fo Check
- 5-5-3. SYNC AGC Adjustment
- 5-5-4. IR Adjustment
- 5-5-5. Chroma Comb Filter Adjustment (1)
- 5-5-6. Emphasis Input Level Adjustment
- 5-5-7. L Mode PB Y Level Adjustment
- 5-5-8. E Mode PB Y Level Adjustment
- 5-5-9. L Mode Y FM Deviation, Y FM Carrier Frequency Adjustment
- 5-5-10. E Mode Y FM Deviation, Y FM Carrier Frequency Adjustment
- 5-5-11. YD Adjustment
- 5-5-12. Chroma Emphasis Adjustment
- 5-5-13. Chroma Comb Filter Adjustment (2)
- 5-5-14. REC C RF Level Adjustment
- 5-5-15. Recording Current Adjustment
- 5-5-16. Y Level Adjustment
- 5-5-17. Titler PLL Adjustment
- 5-5-18. Character Generator Clock Adjustment

5-5-1. Playback Frequency Characteristic Adjustment (VS-76 Board)

Mode	Playback
Signal	Alignment tape: for frequency characteristic adjustment (WR5-7NE)
Measurement point	See Fig. 5-9.
Measuring instrument	Oscilloscope
Adjustment element	RV003 (1A) RV004 (1B) RV002 (2A) RV001 (2B)
Specified value	4.5MHz level: 8.5MHz level= 3: (2 ± 0.2)

Note: The VC-87 board should be removed for this adjustment.

[Adjustment Method]

- 1) Adjust the respective RV adjustment elements so that for 1A, 1B, 2A and 2B PB RF output waveforms, the ratio of the 4.5MHz level to the 8.5MHz is 3: (2 ± 0.2).

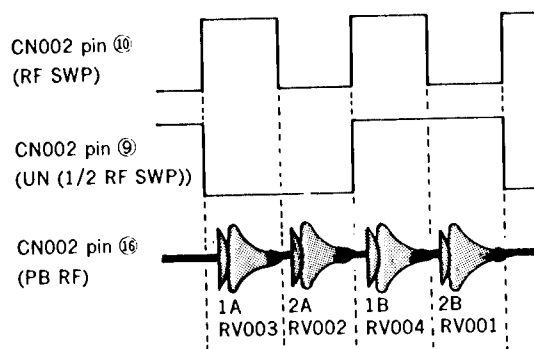


Fig. 5-9.

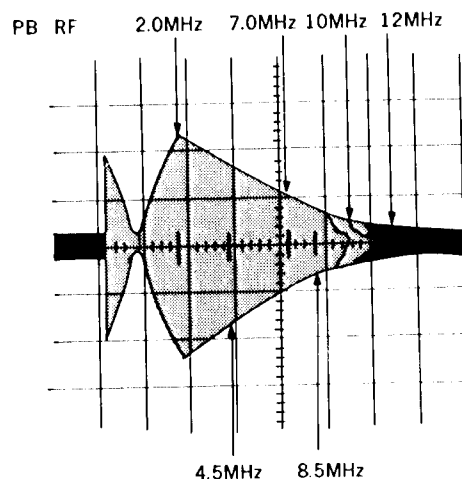


Fig. 5-10.

5-5-2. X'tal Oscillator fo Check (VC-87 Board)

Mode	Playback
Signal	Alignment tape for operational check
Measurement point	W401 pin ④ (FSC) (JL403)
Measuring instrument	Frequency counter Oscilloscope
Specified value	$3579545 \pm 50\text{Hz}$

Note : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Adjustment Method]

- 1) Check that the oscillation frequency at pin ④ of W401 is $3579545 \pm 50\text{Hz}$.

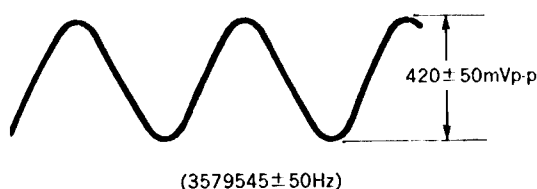


Fig. 5-11.

5-5-3. SYNC AGC Adjustment (VC-87 Board)

Mode	E-E
Signal	Color bar (S VIDEO)
Measurement point	W401 pin ⑧ (EE PB Y) (JL406)
Measuring instrument	Oscilloscope
Adjustment element	RV401
Specified value	$490 \pm 10\text{mVp-p}$

[Adjustment Method]

- 1) Adjust RV401 to obtain the level $490 \pm 10\text{mVp-p}$.

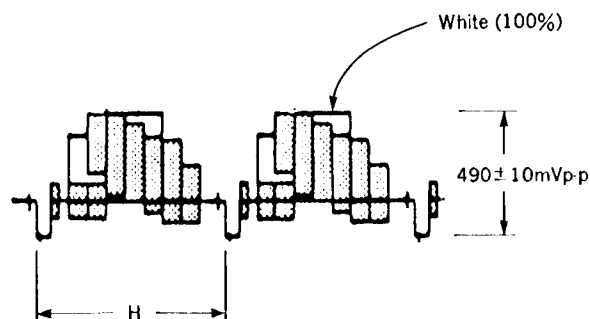


Fig. 5-12.

5-5-4. IR Adjustment (VC-87 Board)

Mode	E-E
Signal	Color bar (VIDEO)
Measurement point	IC401 pin ⑦ (Y COMB OUT) (JL438)
Measuring instrument	Oscilloscope
Adjustment element	RV408
Specified value	Minimize red residual chroma component (40mVp-p or less).

[Adjustment Method]

- 1) Adjust RV408 so that the red residual chroma component is minimized (40mVp-p or less).

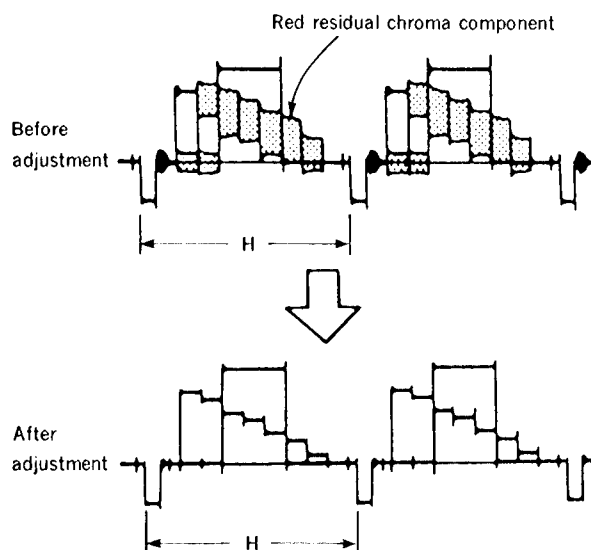


Fig. 5-13.

5-5-5. Chroma Comb Filter Adjustment (1) (VC-87 Board)

Mode	E-E
Signal	Color bar (VIDEO)
Measurement point	IC401 pin ⑩ (C+ CD) (JL437)
Measuring instrument	Oscilloscope
Adjustment element	RV402 RV551
Specified value	Minimize red residual chroma component (12mVp-p or less).

[Adjustment Method]

- 1) Adjust RV402 and RV551 alternately so that the red residual chroma component is minimized (12mVp-p or less).

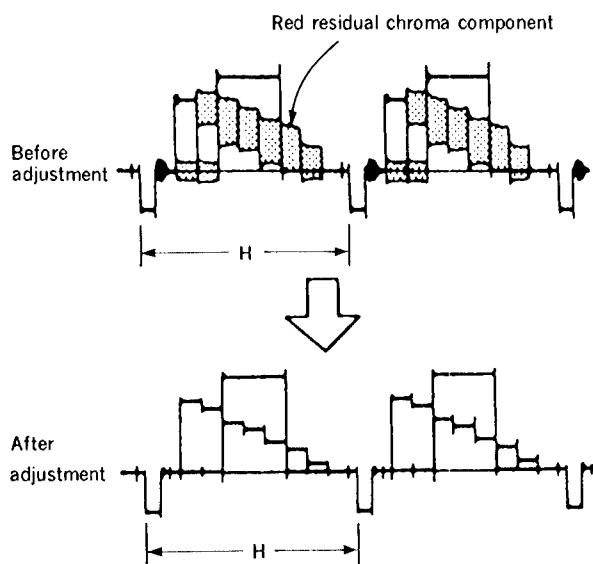


Fig. 5-14.

5-5-6. Emphasis Input Level Adjustment (VC-87 Board)

Mode	E-E
Signal	Color bar (S VIDEO)
Measurement point	Q420 emitter (JL441)
Measuring instrument	Oscilloscope
Adjustment element	RV409
Specified value	$500 \pm 10\text{mVp-p}$

[Adjustment Method]

- 1) Adjust RV409 to obtain the level $500 \pm 10\text{mVp-p}$.

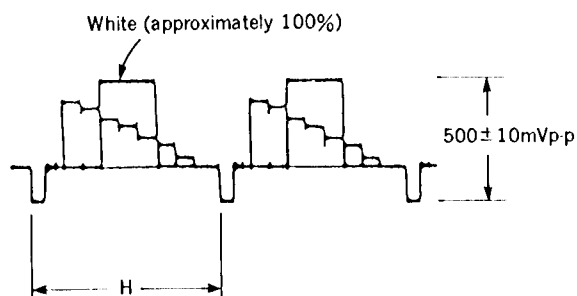


Fig. 5-15.

5-5-7. L Mode PB Y Level Adjustment (VC-87 Board)

Mode	Playback
Signal	Alignment tape : for operational check (WR5-5NSP or WR5-4NSP) color bar portion
Measurement point	W401 pin ⑧ (EE PB Y) (JL406)
Measuring instrument	Oscilloscope
Adjustment element	RV411
Specified value	$490 \pm 10 \text{mVp-p}$

[Adjustment Method]

- 1) Adjust RV411 to obtain the level $490 \pm 10 \text{mVp-p}$.

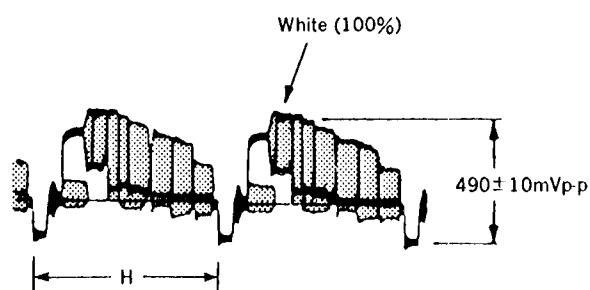


Fig. 5-16.

5-5-8. E Mode PB Y Level Adjustment (VC-87 Board)

Mode	Playback
Signal	Alignment tape : for operational check (WR5-8NSE) color bar portion
Measurement point	W401 pin ⑧ (EE PB Y) (JL406)
Measuring instrument	Oscilloscope
Adjustment element	RV410
Specified value	$490 \pm 10 \text{mVp-p}$

[Adjustment Method]

- 1) Adjust RV410 to obtain the level $490 \pm 10 \text{mVp-p}$.

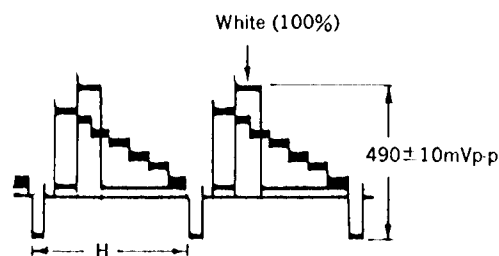


Fig. 5-17.

5-5-9. L Mode Y FM Deviation, Y FM Carrier Frequency Adjustment

Note : After this adjustment, "5-5-10. E Mode Y FM Deviation, Y FM Carrier Frequency Adjustment" should be always performed.

(1) L Mode Y FM Deviation Adjustment (VC-87 Board)

Mode	Record and Playback
Signal	Color bar (S VIDEO)
Measurement point	W401 pin ⑧ (EE PB Y) (JL406)
Measuring instrument	Oscilloscope
Adjustment element	RV404
Specified value	Playback level of $490 \pm 15\text{mVp-p}$

Note : This adjustment assumes that "L Mode PB Y Level Adjustment" has been already completed.

[Adjustment Method]

- 1) Set an MP type cassette tape.
- 2) Record the color bar signal.
- 3) Play back the recorded signal.
- 4) Check the playback output level.
Specification: $490 \pm 15\text{mVp-p}$
- 5) If the specification is not met, turn RV404 as specified below and then repeat Steps 1) to 3).

	Direction of turning RV404
If larger than specified value	Counterclockwise ($\odot$)
If smaller than specified value	Clockwise ($\ominus$)

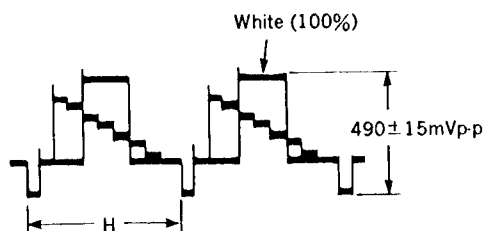


Fig. 5-18.

(2) L Mode Y FM Carrier Frequency Adjustment (VC-87 Board)

Mode	F-E
Signal	No signal
Measurement point	W401 pin ③ (Y RF) (JL428)
Measuring instrument	Frequency counter Oscilloscope
Adjustment element	RV407
Specified value	$4.37 \pm 0.04\text{MHz}$

Note : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Adjustment Method]

- 1) Set an MP type cassette tape.
- 2) Adjust RV407 to obtain the level $4.37 \pm 0.04\text{MHz}$.



$4.37 \pm 0.04\text{MHz}$

Fig. 5-19.

5-5-10. E Mode Y FM Deviation, Y FM Carrier Frequency Adjustment

Note 1 : This adjustment assumes that "5-5-9. I. Mode Y FM Deviation, Y FM Carrier Frequency Adjustment" has been already completed.

Note 2 : The following check should be performed before entering this adjustment :

1. Check to ensure that a connector is inserted into the S VIDEO IN/OUT terminal (also when no signal is applied).

(1) E Mode Y FM Deviation Adjustment (VC-87 Board)

Mode	Record and Playback
Signal	Color bar (S VIDEO)
Measurement point	W401 pin ⑧ (EE PB Y) (JL406)
Measuring instrument	Oscilloscope
Adjustment element	RV405
Specified value	Playback level of $490 \pm 15\text{mVp-p}$

Note : This adjustment assumes that "E Mode PB Y Level Adjustment" has been already completed.

[Adjustment Method]

- 1) Set an ME type cassette tape.
- 2) Record the color bar signal.
- 3) Play back the recorded signal.
- 4) Check the playback output level.
Specification : $490 \pm 15\text{mVp-p}$
- 5) If the specification is not met, turn RV405 as specified below and then repeat Steps 1) to 3).

	Direction of turning RV405
If larger than specified value	Counterclockwise ($\circlearrowleft$)
If smaller than specified value	Clockwise ($\circlearrowright$)

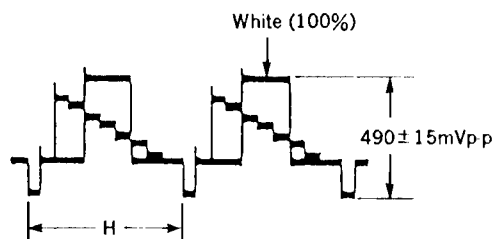


Fig. 5-20.

(2) E Mode Y FM Carrier Frequency Adjustment (VC-87 Board)

Mode	E-E
Signal	No. signal
Measurement point	W401 pin ③ (Y RF) (JL428)
Measuring instrument	Frequency counter Oscilloscope
Adjustment element	RV406
Specified value	$5.98 \pm 0.04\text{MHz}$

Note : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Adjustment Method]

- 1) Set an ME type cassette tape.
- 2) Adjust RV406 to obtain the level $5.98 \pm 0.04\text{MHz}$.



$5.98 \pm 0.04\text{MHz}$

Fig. 5-21.

5-5-11. YD Adjustment (VC-87 Board)

Mode	Playback
Signal	Alignment tape: for operational check dropout portion
Measurement point	VIDEO OUT terminal (terminated at 75Ω)
Measuring instrument	Oscilloscope
Adjustment element	RV403
Specified value	The dropout portion must be flat.

[Adjustment Method]

- 1) Adjust RV403 so that the dropout portion is flat.

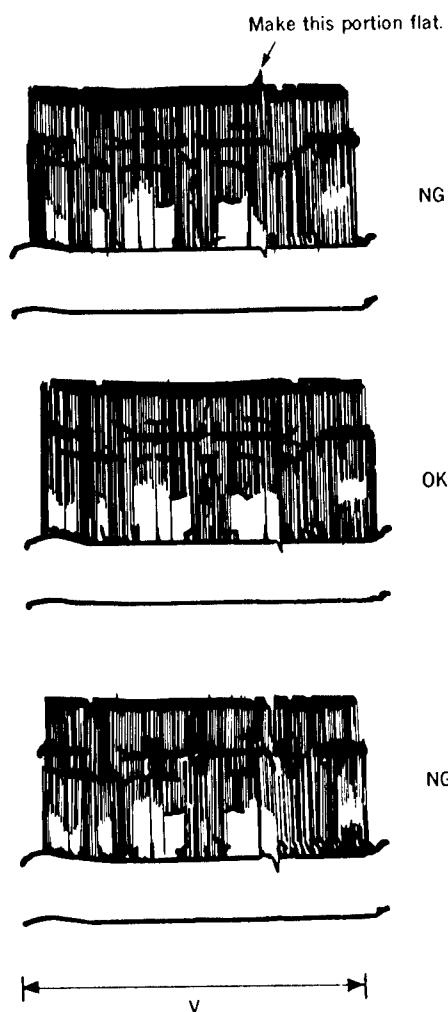


Fig. 5-22.

5-5-12. Chroma Emphasis Adjustment (VC-87 Board)

Mode	Playback
Signal	Alignment tape: for operational check color bar portion
Measurement point	VIDEO IN/OUT terminal
Measuring instrument	Vectorscope
Adjustment element	FL502
Specified value	The vector locus from blue to black must return to the origin.

[Adjustment Method]

- 1) Adjust FL502 so that the vector locus from blue to black returns to the origin.

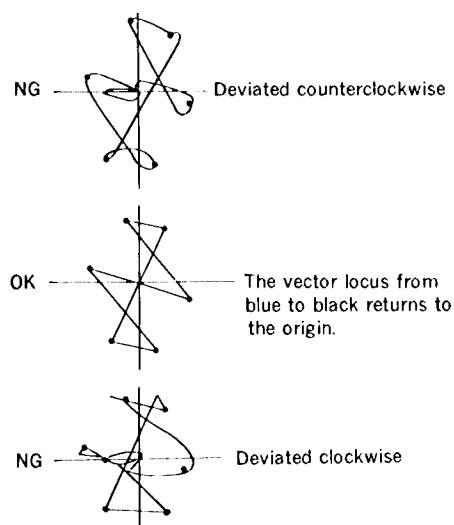


Fig. 5-23.

5-5-13. Chroma Comb Filter Adjustment (2) (VC-87 Board)

Mode	Playback
Signal	Alignment tape for operational check color bar portion
Measurement point	VIDEO IN/OUT terminal
Measuring instrument	Vectorscope
Adjustment element	RV551 RV402
Specified value	The vectorscope shows no change when EDIT switch is toggled between ON and OFF.

[Adjustment Method]

- 1) Adjust RV551 so that the vectorscope shows no change in the direction of phase.
- 2) If there is also any change in the direction of amplitude, adjust RV402.
- 3) Repeat Steps 1) and 2) until the vectorscope shows no change when the EDIT switch is toggled between ON and OFF repeatedly.

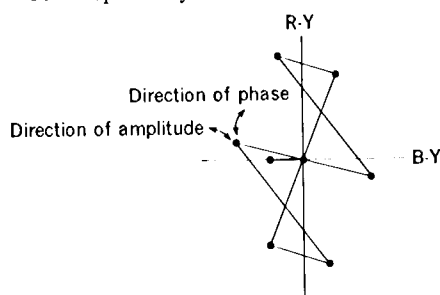


Fig. 5-24.

5-5-14. REC C RF Level Adjustment (VC-87 Board)

Mode	Playback
Signal	Color bar signal
Measurement point	W401 pin ⑤ (REC C RF) (JL427)
Measuring instrument	Oscilloscope
Adjustment element	RV501
Specified value	$130 \pm 5\text{mVp-p}$

[Adjustment Method]

- 1) Adjust RV501 so that the flat portion of the chroma signal RED component has the level $130 \pm 5\text{mVp-p}$.

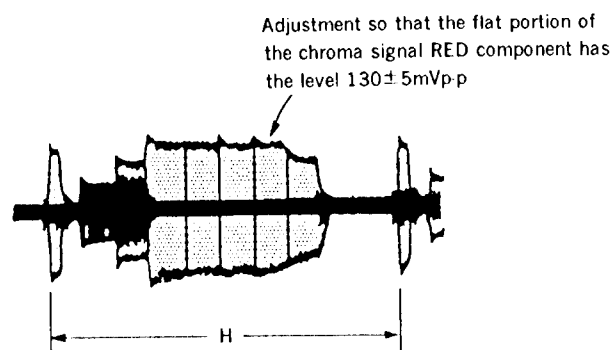


Fig. 5-25.

B: In case of REC 1B

Mode	Record
Signal	Color bar
Measurement point	CH-1: CN002 pin ⑦ (REC 1B) CH-2: CN002 pin ⑨ (1/2 RF SWP)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	27 21
Specified value	$52 \pm 3\text{mVp-p}$

[Connection]

- 1) Short the REC Y RF (JL156) and the REC 5V (JL154).
- 2) Short the REF PILOT (JL788) and the REG GND (JL699).
- 3) Remove the AU-101 board.

[Adjustment Method]

- 1) Set an ME tape and select Record mode.
- 2) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 3) Select adjustment page D and adjustment address 27 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust to $52 \pm 3\text{mVp-p}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Set to adjustment address 21 and write the same data for adjustment address 27 with the adjustment remote control.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

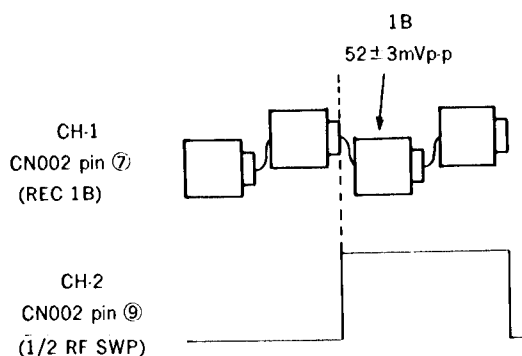


Fig. 5-28.

C: In case of REC 2A

Mode	Record
Signal	Color bar
Measurement point	CH-1: CN002 pin ⑥ (REC 2A) CH-2: CN002 pin ⑨ (1/2 RF SWP)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	28 22
Specified value	$52 \pm 3\text{mVp-p}$

[Connection]

- 1) Short the REC Y RF (JL156) and the REC 5V (JL154).
- 2) Short the REF PILOT (JL788) and the REG GND (JL699).
- 3) Remove the AU-101 board.

[Adjustment Method]

- 1) Set an ME tape and select Record mode.
- 2) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 3) Select adjustment page D and adjustment address 28 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust to $52 \pm 3\text{mVp-p}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Set to adjustment address 22 and write the same data for adjustment address 28 with the adjustment remote control.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

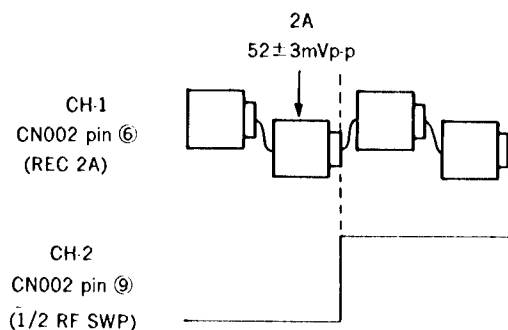


Fig. 5-29.

D: In case of REC 2B

Mode	Record
Signal	Color bar
Measurement point	CH-1: CN002 pin ⑤ (REC 2B) CH-2: CN002 pin ⑨ (1/2 RF SWP)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	29 23
Specified value	$52 \pm 3\text{mVp-p}$

[Connection]

- 1) Short the REC Y RF (JL156) and the REC 5V (JL154).
- 2) Short the REF PILOT (JL788) and the REG GND (JL699).
- 3) Remove the AU-101 board.

[Adjustment Method]

- 1) Set an ME tape and select Record mode.
- 2) Select adjustment page 0, adjustment address 00 and adjustment data 01 with the adjustment remote control.
- 3) Select adjustment page D and adjustment address 29 with the adjustment remote control.
- 4) Change the adjustment data with the adjustment remote control and adjust to $52 \pm 3\text{mVp-p}$.
- 5) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.
- 6) Set to adjustment address 23 and write the same data for adjustment address 29 with the adjustment remote control.
- 7) Press the PAUSE button on the adjustment remote control in order to store the adjustment data.

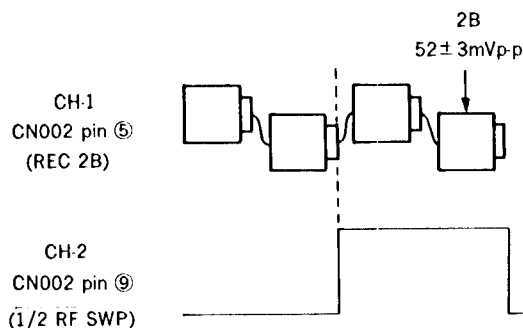


Fig. 5-30.

(3) REC AFM Recording Current Preset Check

Mode	Record
Signal	No signal
Measurement point	Q197 emitter (REC C RF)
Measuring instrument	Oscilloscope
Specified value	$45 \pm 10\text{mVp-p}$

[Connection]

- 1) Short the REF PILOT (JL788) and the REG GND (JL699).

[Checking Method]

- 1) Set an ME tape and select Record mode.
- 2) Check for $45 \pm 10\text{mVp-p}$.

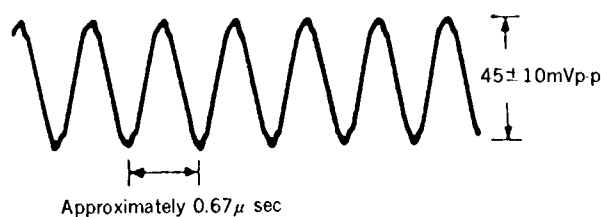


Fig. 5-31.

(4) REC ATF Recording Current Preset Check

Mode	Record
Signal	No signal
Measurement point	Q197 emitter (REC C RF)
Measuring instrument	Oscilloscope
Specified value	$35 \pm 10\text{mVp-p}$

[Connection]

- 1) Remove the AU-101 board.

[Checking Method]

- 1) Set an ME tape and select Record mode.
- 2) Check for $35 \pm 10\text{mVp-p}$.

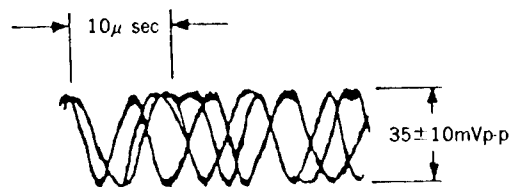


Fig. 5-32.

(5) Chroma Flicker Check and Adjustment (VS-76 Board)

Mode	Self record playback
Signal	Color bar
Measurement point	CH-1 (1 : 1 probe): Q506 collector (PB C RF IN) CH-2 (10 : 1 probe): CN002 pin ⑨ (1/2 RF SWP)
Measuring instrument	Oscilloscope
Adjustment page	D
Adjustment address	26 (ME REC C 1A) 27 (ME REC C 1B) 28 (ME REC C 2A) 29 (ME REC C 2B)
Specified value	$\frac{V_{c1a}}{V_{c1a'}} \times 100 = 100 \pm 1\frac{1}{11} (\%)$ $\frac{V_{c2a}}{V_{c2a'}} \times 100 = 100 \pm 1\frac{1}{11} (\%)$

Note : This adjustment assumes that both "REC Y Recording Current Preset Adjustment" and "REC C Recording Current Preset Adjustment" have been completed.

[Checking Method]

- 1) Record the color bar signal.
- 2) Play back the recorded portion.
- 3) Select adjustment page 0, adjustment address 01 and adjustment data 00 with the adjustment remote control.
- 4) Let 1a and 2a output levels measured to be V_{c1a} and V_{c2a} respectively.
- 5) Select adjustment page 0, adjustment address 01 and adjustment data 04 with the adjustment remote control.
- 6) Let 1a and 2a output levels measured to be $V_{c1a'}$ and $V_{c2a'}$ respectively.
- 7) If any of the specified values is not met, perform the following adjustment.

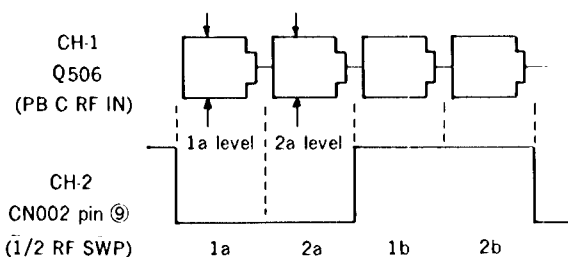


Fig. 5-33.

[Adjustment Method]

- 1) If any of the specified values is not met, from the measured values, calculate the following values:

$$\Delta V_{c1} = |V_{c1a} - V_{c1a'}| / 2$$

$$\Delta V_{c2} = |V_{c2a} - V_{c2a'}| / 2$$

Note : | | represents an absolute value.

- 2) Make the following calculations:

The smaller level of playback levels V_{c1a} and $V_{c1a'}$ is:

$$A = \left\{ \frac{(\text{Smaller value of } V_{c1a} \text{ and } V_{c1a'}) + \Delta V_{c1}}{(\text{Smaller value of } V_{c1a} \text{ and } V_{c1a'})} \right\} \times 52(\text{mVp-p})$$

The larger level of playback levels V_{c1a} and $V_{c1a'}$ is:

$$B = \left\{ \frac{(\text{Larger value of } V_{c1a} \text{ and } V_{c1a'}) - \Delta V_{c1}}{(\text{Larger value of } V_{c1a} \text{ and } V_{c1a'})} \right\} \times 52(\text{mVp-p})$$

The smaller level of playback levels V_{c2a} and $V_{c2a'}$ is:

$$C = \left\{ \frac{(\text{Smaller value of } V_{c2a} \text{ and } V_{c2a'}) + \Delta V_{c2}}{(\text{Smaller value of } V_{c2a} \text{ and } V_{c2a'})} \right\} \times 52(\text{mVp-p})$$

The larger level of playback levels V_{c2a} and $V_{c2a'}$ is:

$$D = \left\{ \frac{(\text{Larger value of } V_{c2a} \text{ and } V_{c2a'}) - \Delta V_{c2}}{(\text{Larger value of } V_{c2a} \text{ and } V_{c2a'})} \right\} \times 52(\text{mVp-p})$$

- 3) Let the values calculated from V_{c1a} , $V_{c1a'}$, V_{c2a} and $V_{c2a'}$ to be the specified values for 1a, 1b, 2a, and 2b respectively. Based on these specifications, perform "REC C Recording Current Preset Adjustment". When adjusting to the specified value, compare V_{c1a} with $V_{c1a'}$. If V_{c1a} is larger than $V_{c1a'}$, set 1a to A and 1b to B. If V_{c1a} is smaller than $V_{c1a'}$, set 1a to B and 1b to A. In the same manner, compare V_{c2a} with $V_{c2a'}$. If V_{c2a} is larger than $V_{c2a'}$, set 2a to C and 2b to D. If V_{c2a} is smaller than $V_{c2a'}$, set 2a to D and 2b to C.
- 4) After this adjustment, perform "Chroma Flicker Check" again and repeat this adjustment until the specifications are met.

5-5-16. Y Level Adjustment (VS-76 Board)

Mode	E-E
Signal	Color bar (S VIDEO)
Measurement point	CN304 pin ⑩ (V OUT Y) (JL301)
Measuring instrument	Oscilloscope
Adjustment element	RV301
Specified value	$450 \pm 10 \text{ mVp-p}$

Note: This adjustment assumes that "SYNC AGC Adjustment" has been completed.

[Adjustment Method]

- 1) Adjust RV301 to obtain the level $450 \pm 10 \text{ mVp-p}$.

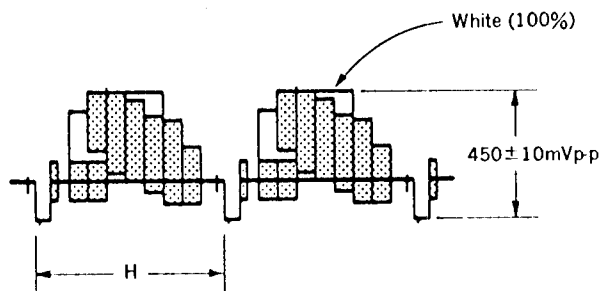


Fig. 5-34.

5-5-17. Titler PLL Adjustment (TI-34 Board)

Mode	E-E
Signal	No signal
Measurement point	See Fig. 5-35. (V_{PLL} : JL832)
Measuring instrument	Oscilloscope (DC range)
Adjustment element	CT801
Specified value	$2.42 \pm 0.1 \text{ Vdc}$

[Connection]

- 1) Short pin ⑫ of CN801 (SS 5V : JL821) and pin ④ of IC803 (PLL ADJ : JL831) with a jumper wire.

[Adjustment Method]

- 1) Adjust to $2.42 \pm 0.1 \text{ Vdc}$ with CT801.
- 2) After this adjustment, remove the jumper wire.

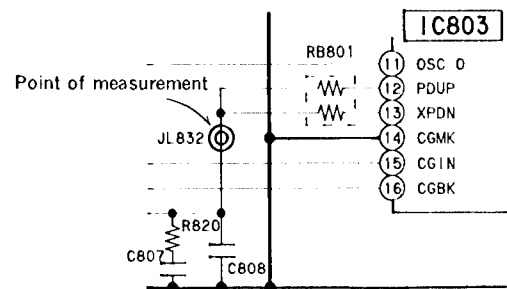


Fig. 5-35.

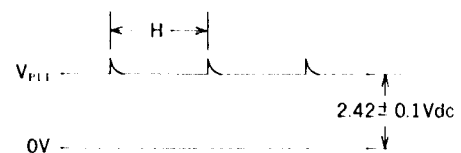


Fig. 5-36.

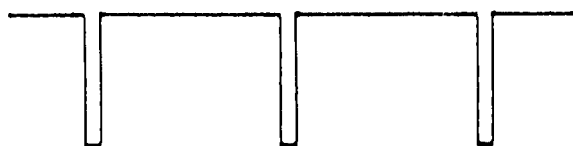
5-5-18. Character Generator Clock Adjustment (TI-34 Board)

Mode	E-E
Signal	No signal
Measurement point	IC802 pin ⑦ (JL830)
Measuring instrument	Frequency counter Oscilloscope
Adjustment element	CT802
Specified value	$6.79 \pm 0.05\text{MHz}$

Note : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Adjustment Method]

- 1) Adjust to $6.79 \pm 0.05\text{MHz}$ with CT802.
- 2) After this adjustment, remove the jumper wire.



$6.79 \pm 0.05\text{MHz}$

Fig. 5-37.

5-6. AUDIO SYSTEM ADJUSTMENT

- The color bar signal should be used as the video signal input for these adjustments.

[Connection of Audio Measuring Instruments]

When performing the Audio System Adjustment, connect audio system measuring instruments as well as video system measuring instruments as illustrated in Fig. 5-38. And place the POWER switch in the "VIDEO" position. Change the IN/OUT select switch depending on the current mode as follows :

- IN position Record mode
- OUT position Playback mode

Unless otherwise specified, place the BILINGUAL switch in the following position :

- Green (STEREO) position

Note 1 : When inputting audio signal, input the same signal on both the L and R channels unless otherwise specified.

Note 2 : Be sure to insert a plug (shorting plug or dummy plug) into the AUDIO IN/OUT terminal (right). If no plug is inserted to the terminal, the MONAURAL mode is activated which does not permit correct adjustment.

(MONAURAL mode)

Record The REC AFM RF 1.7MHz carrier will not be output.

Playback L+R signal will be output from the audio INPUT/OUTPUT terminal (left).

Note 3 : For the adjustment items in which the adjustment is made on both L and R channels, [] indicates the adjustment item on the R channel.

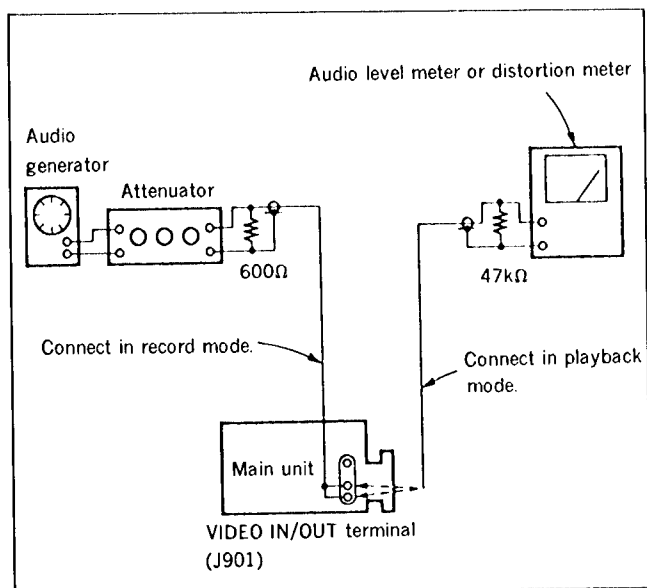


Fig. 5-38.

[Adjustment Sequence]

- 5-6-1. Recording Matrix L- R Adjustment
- 5-6-2. Recording Matrix L+ R Check
- 5-6-3. IR Adjustment
- 5-6-4. 1.5MHz Carrier Frequency Check
- 5-6-5. 1.7MHz Carrier Frequency Check
- 5-6-6. Deviation Adjustment
- 5-6-7. Playback Matrix L- R Adjustment
- 5-6-8. 1.5MHz Recording Level Check
- 5-6-9. 1.7MHz Recording Level Check
- 5-6-10. Overall Level Characteristic Check
- 5-6-11. Overall Frequency Characteristic Check
- 5-6-12. Overall Level Characteristic Separation Check
- 5-6-13. Overall Distortion Check
- 5-6-14. Overall Noise Level Check

5-6-1. Recording Matrix L-R Adjustment (AU-101 Board)

Mode	Record
Signal	400Hz, - 7.5dBs: Input to AUDIO IN/OUT jacks, L and R channels
Measurement point	IC802 pin ⑩ (JL863)
Measuring instrument	Oscilloscope
Adjustment element	RV806
Specified value	$0 \pm 5\text{mVp-p}$

Note : A 1 : 1 probe should be used.

[Adjustment Method]

- 1) Adjust RV806 so that the signal level is $0 \pm 5\text{mVp-p}$.

5-6-2. Recording Matrix L+ R Check (AU-101 Board)

Mode	Record
Signal	1. 400Hz, - 7.5dBs: AUDIO IN/OUT jack, L channel 2. 400Hz, - 7.5dBs: AUDIO IN/OUT jack, R channel
Measurement point	IC801 pin ⑩ (JL843)
Measuring instrument	Oscilloscope
Specified value	The difference in the level measured for between input to L-channel jack and input to R-channel jack must be within $0 \pm 10\text{mVp-p}$.

Note : When measuring the signal level at pin ⑩ of IC801, allow more than 1 minute after the signal is input before measurement. (This is intended to stabilize the AGC.)

[Checking Method]

- 1) Input the signal 400Hz, - 7.5dBs only to the L-channel AUDIO IN/OUT jack. (Insert a shorting plug into the R-channel AUDIO IN/OUT jack.)
- 2) Read the signal level at pin ⑩ of IC801 and make a note of it.
- 3) Input the signal 400Hz, - 7.5dBs only to the R-channel AUDIO IN/OUT jack. (Insert a shorting plug into the L-channel AUDIO IN/OUT jack.)
- 4) Check to ensure that the level at pin ⑩ of IC801 is [the level measured in Step 2)] $\pm 10\text{mVp-p}$.

5-6-3. IR Adjustment (AU-101 Board)

Mode	Self record playback
Measurement point	1.5M IR : IC801 pin ④ (JL852)-pin ⑥ (JL853) 1.7M IR : IC802 pin ④ (JL874)-pin ⑥ (JL875)
Measuring instrument	Digital voltmeter
Adjustment element	1.5M IR : RV801 1.7M IR : RV803
Specified value	$0 \pm 10\text{mVdc}$

[Adjustment Method]

- 1) Record the signal.
- 2) Play back the signal recorded in Step 1).
- 3) Adjust RV801 and RV803 so that the potential differences between the two points for 1.5M IR and 1.7M IR are $0 \pm 10\text{mVdc}$ respectively.

5-6-4. 1.5MHz Carrier Frequency Check (AU-101 Board)

Mode	Record
Signal	No signal
Measurement point	IC801 pin ⑧ (JL848)
Measuring instrument	Frequency counter Oscilloscope
Specified value	$1.500 \pm 0.002\text{MHz}$

Note 1 : A 10 : 1 probe should be used for connection of a frequency counter.

Note 2 : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Checking Method]

- 1) Check the 1.5MHz carrier frequency for $1.500 \pm 0.002\text{MHz}$.



$1.500 \pm 0.002\text{MHz}$

Fig. 5-39.

5-6-5. 1.7MHz Carrier Frequency Check (AU-101 Board)

Mode	Record
Signal	No signal
Measurement point	IC802 pin ⑧ (JL868)
Measuring instrument	Frequency counter Oscilloscope
Specified value	$1.700 \pm 0.002\text{MHz}$

Note 1 : A 10 : 1 probe should be used for connection of a frequency counter.

Note 2 : This frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Checking Method]

- 1) Check the 1.7MHz carrier frequency for $1.700 \pm 0.002\text{MHz}$.



$1.700 \pm 0.002\text{MHz}$

Fig. 5-40.

5-6-6. Deviation Adjustment (AU-101 Board)

(1) 1.5MHz Deviation Adjustment

Mode	Playback
Signal	Alignment tape : for operational check (WR5-9NS)
Measurement point	AUDIO IN/OUT jack, L. channel
Measuring instrument	Audio level meter
Adjustment element	RV802
Specified value	$-7.5 \pm 0.2\text{dB}$

Note : Set the BILINGUAL switch to MAIN.

[Adjustment Method]

- 1) Adjust RV802 to obtain the level $-7.5 \pm 0.2\text{dB}$.

(2) 1.7MHz Deviation Adjustment

Mode	Playback
Signal	Alignment tape : for operational check (WR5-9NS)
Measurement point	AUDIO IN/OUT jack, R channel
Measuring instrument	Audio level meter
Adjustment element	RV804
Specified value	$-7.5 \pm 0.2\text{dB}$

Note : Set the BILINGUAL switch to SUB.

[Adjustment Method]

- 1) Adjust RV804 to obtain the level $-7.5 \pm 0.2\text{dB}$.

5-6-7. Playback Matrix L-R Adjustment (AU-101 Board)

Mode	Self record playback
Signal	Alignment tape : for operational check (WR5-9NS)
Measurement point	AUDIO IN/OUT jack, L channel
Measuring instrument	Audio level meter
Adjustment element	RV805
Specified value	- 40dBs or less

[Adjustment Method]

- 1) Record the signal. (A shorting plug should be inserted into the L-channel AUDIO IN/OUT jack.)
- 2) Play back the recorded portion.
- 3) Adjust RV805 so that the level at the L-channel AUDIO IN/OUT jack is - 40dBs or less.

5-6-8. 1.5MHz Recording Level Check (AU-101 Board)

Mode	Record
Signal	No signal
Measurement point	CN801 pin ⑦ (REC AFM) (J1.806)
Measuring instrument	Oscilloscope
Specified value	$48 \pm 8\text{mVp-p}$

[Connection]

- 1) Remove the pin plug from the R-channel AUDIO IN/OUT jack (red). (MONORAL Record mode)

[Checking Method]

- 1) Check the 1.5MHz REC AFM RF signal level for $48 \pm 8\text{mVp-p}$. (Read the center level of the bright line width.)

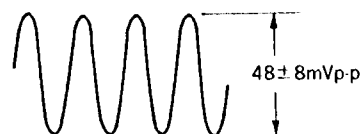


Fig. 5-41.

5-6-9. 1.7MHz Recording Level Check (AU-101 Board)

Mode	Record
Signal	No signal
Measurement point	CN801 pin ⑦ (REC AFM) (JL806)
Measuring instrument	Oscilloscope
Specified value	$42 \pm 6\text{mVp-p}$

Note: When measuring this level, short pin ⑧ of IC801 (JL848) with GND.

[Checking Method]

- 1) Check to ensure that a shorting plug is inserted into the R-channel AUDIO IN/OUT jack (red).
- 2) Check the 1.7MHz REC AFM RF signal level for $42 \pm 6\text{mVp-p}$. (Read the center level of the bright line width.)

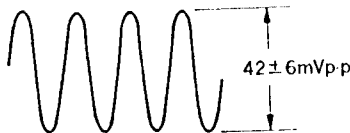


Fig. 5-42.

5-6-10. Overall Level Characteristic Check

Mode	Self record playback
Signal	400Hz, - 7.5dBs
Measurement point	AUDIO OUT jack, L channel [R channel]
Measuring instrument	Audio level meter
Specified value	- 7.5 ± 2dBs

[Checking Method]

- 1) Record the signal.
- 2) Play back the recorded portion.
- 3) Check the audio output level for - 7.5 ± 2dBs.

5-6-11. Overall Frequency Characteristic Check

Mode	Self record playback
Signal	Ⓐ 400Hz, - 17.5dBs Ⓑ 30Hz, - 17.5dBs Ⓒ 10kHz, - 17.5dBs
Measurement point	AUDIO OUT jack, L channel [R channel]
Measuring instrument	Audio level meter
Specified value	When 400Hz playback output level is set to 0dB, the respective playback levels for 30Hz and 10kHz must be 0 ± 3dB.

[Checking Method]

- 1) Record the signals Ⓐ to Ⓒ in sequence.
- 2) Play back the recorded portion.
- 3) When the 400Hz playback output level is set to 0dB, check to ensure that the respective playback levels for 30Hz and 10kHz are 0 ± 3dB.

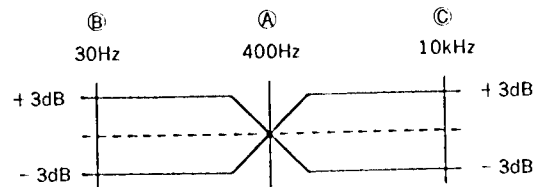


Fig. 5-43.

5-6-12. Overall Level Characteristic Separation Check

Mode	Self record playback
Signal	400Hz, - 17.5dBs: AUDIO IN/OUT jack, L channel [R channel] No signal (Insert a shorting plug.): AUDIO IN/OUT jack, R channel [L channel]
Measurement point	AUDIO OUT jack, L channel [R channel]
Measurement instrument	Audio level meter
Specified value	Signal level: - 7.5 ± 2dBs Crosstalk level: - 27.5dBs or less

Note 1: When measuring the L-channel playback output level, be sure to insert a dummy plug into the R-channel jack.

Note 2: Make sure that the BILINGUAL switch is placed in the Green (STEREO) position.

[Checking Method]

- 1) Record the signal.
- 2) Play back the recorded portion.
- 3) Check the output level at the L-channel [R-channel] AUDIO IN/OUT jack for - 7.5 ± 2dBs.
- 4) Check the output level at the R-channel [L-channel] AUDIO IN/OUT jack for - 27.5dBs or less.

5-6-13. Overall Distortion Check

Mode	Self record playback
Signal	400Hz, - 7.5dBs
Measurement point	AUDIO OUT jack, L channel [R channel]
Measuring instrument	Distortion meter
Specified value	0.8% or less* ¹

[Checking Method]

- 1) Record the signal.
 - 2) Play back the recorded portion.
 - 3) Check that the distortion factor is 0.8% or less*¹.
- * 1: The value when 200Hz to 6kHz BPF is used.

5-6-14. Overall Noise Level Check

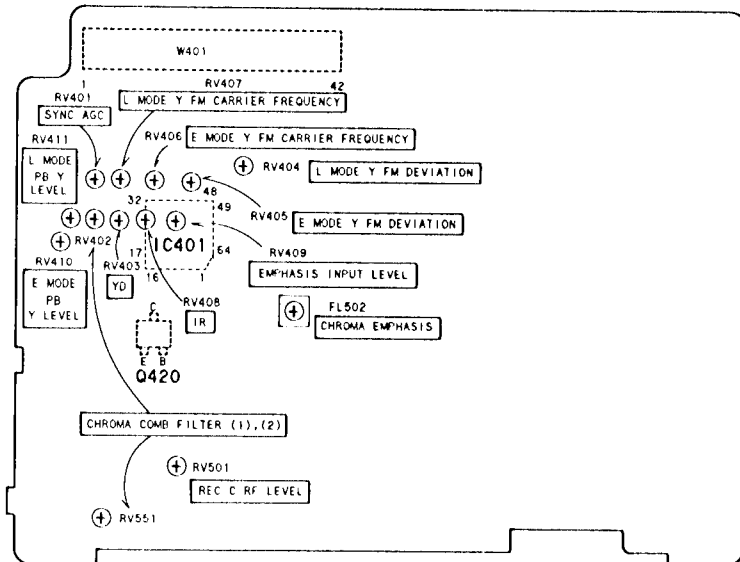
Mode	Self record playback
Signal	No signal (Insert a shorting plug into the AUDIO IN jack.)
Measurement point	Audio OUT jack, L channel [R channel]
Measuring instrument	Audio level meter
Specified value	- 65.0dBs or less* ²

[Checking Method]

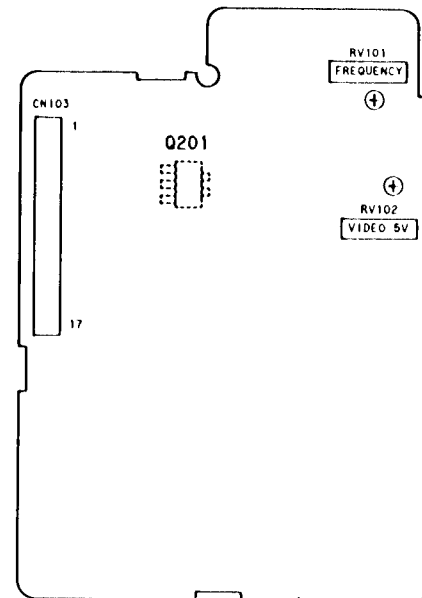
- 1) Record the signal.
 - 2) Play back the recorded portion.
 - 3) Check that the noise level is - 65.0dBs or less*².
- * 2: The value when a HIF-A weighing filter is used.

5-7. ADJUSTING PART LOCATION DIAGRAM

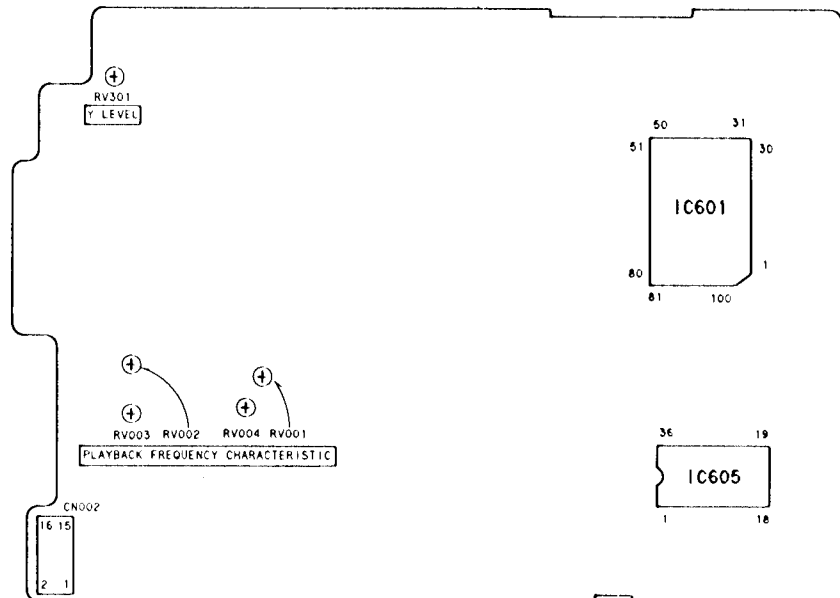
VC-87 BOARD (COMPONENT SIDE)



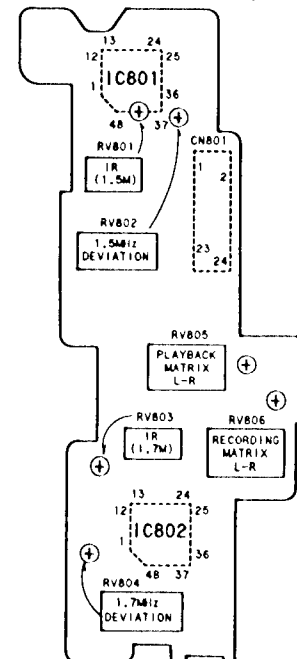
DD-33 BOARD (COMPONENT SIDE)



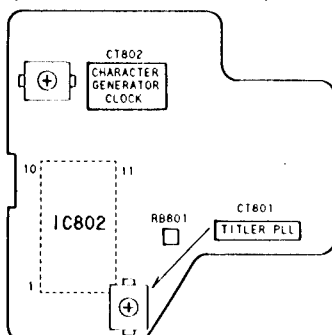
VS-76 BOARD (COMPONENT SIDE)



AU-101 BOARD (COMPONENT SIDE)



T1-34 BOARD (COMPONENT SIDE)



5-6-9. 1.7MHz Recording Level Check (AU-101 Board)

Mode	Record
Signal	No signal
Measurement point	CN801 pin ⑦ (REC AFM) (JL806)
Measuring instrument	Oscilloscope
Specified value	$42 \pm 6\text{mVp-p}$

Note: When measuring this level, short pin ⑧ of IC801 (JL848) with GND.

[Checking Method]

- 1) Check to ensure that a shorting plug is inserted into the R-channel AUDIO IN/OUT jack (red).
- 2) Check the 1.7MHz REC AFM RF signal level for $42 \pm 6\text{mVp-p}$. (Read the center level of the bright line width.)

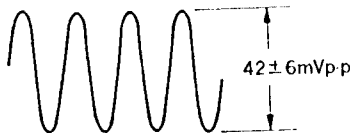


Fig. 5-42.

5-6-10. Overall Level Characteristic Check

Mode	Self record playback
Signal	400Hz, - 7.5dBs
Measurement point	AUDIO OUT jack, L channel [R channel]
Measuring instrument	Audio level meter
Specified value	- 7.5 $\pm$ 2dBs

[Checking Method]

- 1) Record the signal.
- 2) Play back the recorded portion.
- 3) Check the audio output level for - 7.5 $\pm$ 2dBs.

5-6-11. Overall Frequency Characteristic Check

Mode	Self record playback
Signal	Ⓐ 400Hz, - 17.5dBs Ⓑ 30Hz, - 17.5dBs Ⓒ 10kHz, - 17.5dBs
Measurement point	AUDIO OUT jack, L channel [R channel]
Measuring instrument	Audio level meter
Specified value	When 400Hz playback output level is set to 0dB, the respective playback levels for 30Hz and 10kHz must be 0 $\pm$ 3dB.

[Checking Method]

- 1) Record the signals Ⓐ to Ⓒ in sequence.
- 2) Play back the recorded portion.
- 3) When the 400Hz playback output level is set to 0dB, check to ensure that the respective playback levels for 30Hz and 10kHz are 0 $\pm$ 3dB.

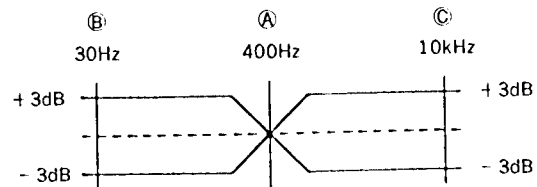


Fig. 5-43.

5-6-12. Overall Level Characteristic Separation Check

Mode	Self record playback
Signal	400Hz, - 17.5dBs: AUDIO IN/OUT jack, L channel [R channel] No signal (Insert a shorting plug.): AUDIO IN/OUT jack, R channel [L channel]
Measurement point	AUDIO OUT jack, L channel [R channel]
Measurement instrument	Audio level meter
Specified value	Signal level: - 7.5 $\pm$ 2dBs Crosstalk level: - 27.5dBs or less

Note 1: When measuring the L-channel playback output level, be sure to insert a dummy plug into the R-channel jack.

Note 2: Make sure that the BILINGUAL switch is placed in the Green (STEREO) position.

[Checking Method]

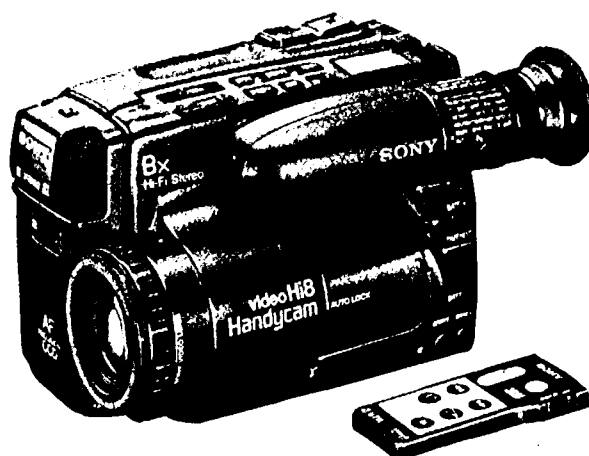
- 1) Record the signal.
- 2) Play back the recorded portion.
- 3) Check the output level at the L-channel [R-channel] AUDIO IN/OUT jack for - 7.5 $\pm$ 2dBs.
- 4) Check the output level at the R-channel [L-channel] AUDIO IN/OUT jack for - 27.5dBs or less.

Handycam

NEW TECHNICAL THEORY FOR SERVICING

CCD-TR81

OPERATION MANUAL



8 VIDEO CAMERA RECORDER
SONY®

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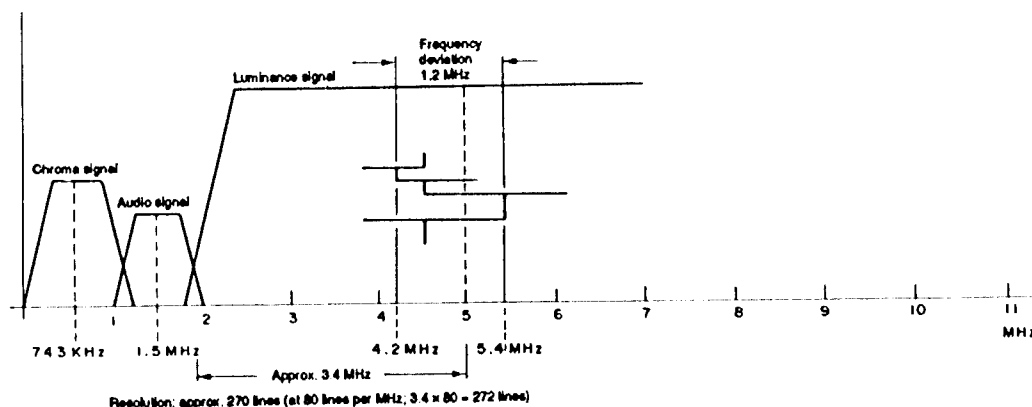
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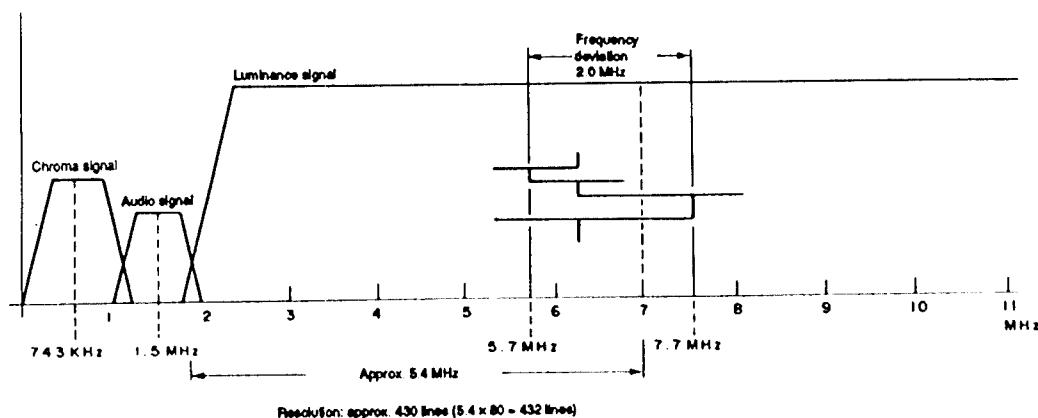
Main Features

- Hi-8 principle
Assures horizontal resolution of more than 400 lines.

Frequency allocation in conventional 8mm video



Frequency allocation in Hi-8 video



Use of Hi-8 MP tapes is possible, thanks to the addition of a Hi-8 MP tape detection switch, which was not present in the conventional Q (FL) mechanism.

- Hi-Fi stereo
Allows recording with natural ambience (bilingual recording is not possible).
- Wireless remote control
Allows control of basic functions from a convenient location.
- Mach Auto-Focus
Inner focussing system with superior response and swift automatic adjustment from about 1 cm to infinite.
- Brightness control
Iris and gain can be adjusted in tandem with one control. This prevents blackening in shots against the light and allows faithful shots also in indoor or night settings.
- World clock
After having adjusted the time for one city (for example Tokyo), simply choosing from a menu of 24 cities automatically compensates for the time zone, including summer time.

- S video input/output

Separate Y/C routing allow connections which preserve the high picture quality of Hi-8.

- x8 zoom with variable speed

Depending on how strongly the zoom lever is pushed, the built-in power zoom selects one of two speeds. In high-speed mode, full zoom from TELE to WIDE requires only 3 seconds.

1. CAMERA CIRCUITS

1-1. Timing Generator

The timing generator IC002 (TG) is located on HIC101 and provides the following timing pulses for camera operation.

(1) H register drive pulse for CCD imager	(H1, H2, LH1)
(2) V register drive pulse for CCD imager	(XV1, XV2, XV3, XV4)
(3) Sensor readout drive pulse for CCD imager	(XSG1, XSG2)
(4) Precharge gate pulse for CCD imager	(PG)
(5) Precharge S/H pulse for sample-and-hold circuit	(XSHP)
(6) Data S/H pulse for sample-and-hold circuit	(XSHD)
(7) Color separation S/H for sample-and-hold circuit	(XSP1, XSP2)
(8) Switching S/H pulse for sample-and-hold circuit	(XSH1, XSH2)
(9) Chroma delay line clock	(XDL1, XDL2)
(10) Burst flag gate pulse for encoder	(BFG)
(11) Clamping pulse	(CLP1 - CLP4)
(12) Preblanking pulse	(PBLK)
(13) Line identification pulse	(ID)
(14) Charge sweep pulse for CCD imager	(XSUB)

The timing generator IC002 operates when there is an HD and VD pulse for synchronization with the 8fsc clock and the sync generator IC151. Note that the electronic shutter is controlled by serial transfer via the system bus (pin 4 STP, pin 5 CLK, pin 6 DATA).

Defect compensation is provided by using a ROM (IC001) to match each CCD. When the timing generator reads the data, XVCT (pin 10) sets Q001 to ON and supplies power to IC001. Parallel data are read into pins 11-14, using the parallel address specified by pins 15-20 of the timing generator. For defect compensation, the output of the color separation pulse is interrupted.

The 4fsc clock pulse (CL) is produced by dividing the output of the 8fsc oscillator by 2. This clock is supplied to IC151.

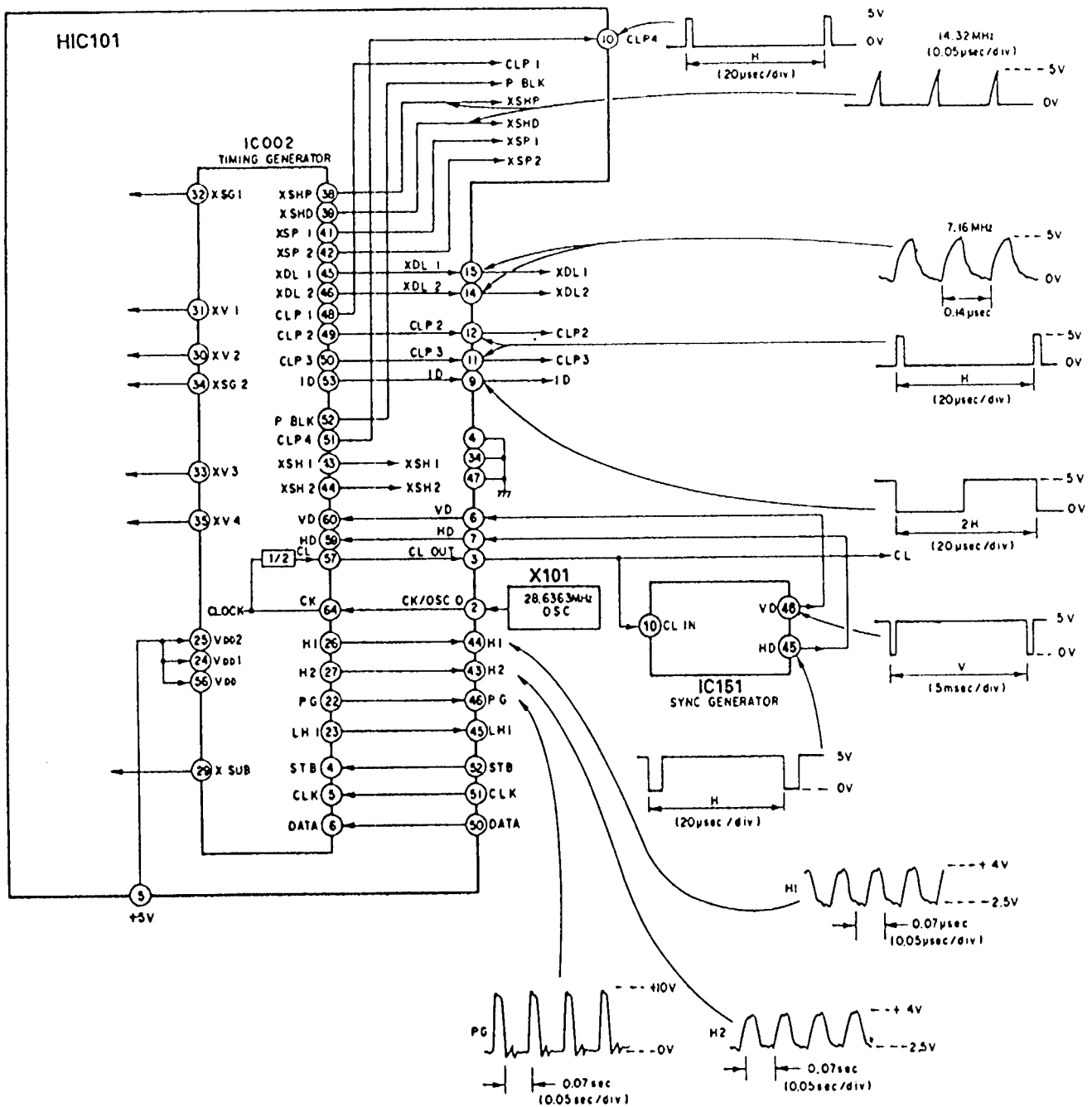


Fig. 1-1

1-2. CCD Imager Drive

The CCD imager in this camera is an ICX038AN (1/2 inch, 410,000 pixels).

1-2-1. H Register Drive

The H register of the CCD imager is directly driven by the timing generator H1 and H2 pulses.

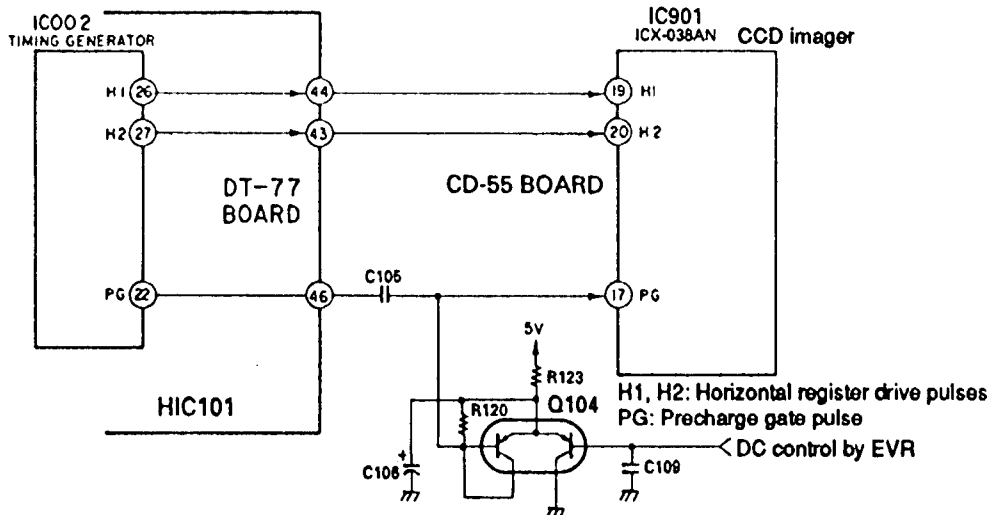
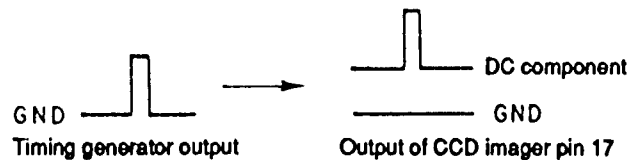


Fig. 1-2

The amplitude of the precharge gate pulse is superimposed with the approximate DC component of the timing generator output (different for each CCD imager). Since the EVR output has an impedance, Q104 (right transistor) is used as a buffer and Q104 (left transistor) serves as a diode, to impose the DC component on the pulse.



The DC component differs for each CCD and is indicated on the reverse side of the CCD with a single-digit number from 1-7.

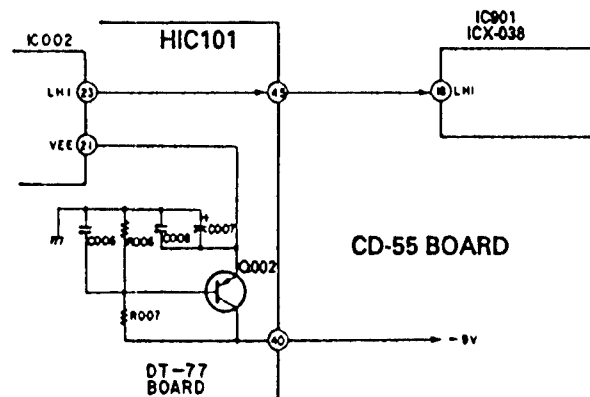


Fig. 1-3

The LH1 pulse drives the last register of ICX038 in the horizontal direction. The amplitude of LH1 is larger than that of H1 and H2. By driving the register directly before the horizontal output gate with a larger amplitude, transfer efficiency in the horizontal direction is improved.

A simple power supply circuit consisting of Q002, R006, C006, C007, and C008 generates a voltage of about 4 V from -9 V and provides it to pin 21 of the timing generator. The amplitude of LH1 at pin 23 is approx. 9 V.

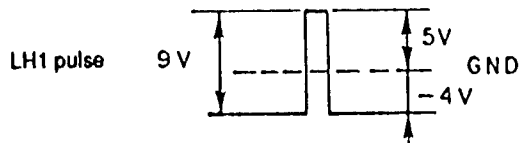


Fig. 1-4

1-2-2. V Register Drive

The V register drive is basically identical to a conventional CCD. The V drive clock requires three amplitude levels, which cannot be directly supplied by the timing generator, the C-MOS V driver IC003 (on HIC 101) is used.

The V driver switches the three voltages (15, 0 and -9 V) according to the V clock pulse and sensor readout pulse, to generate the drive pulse.

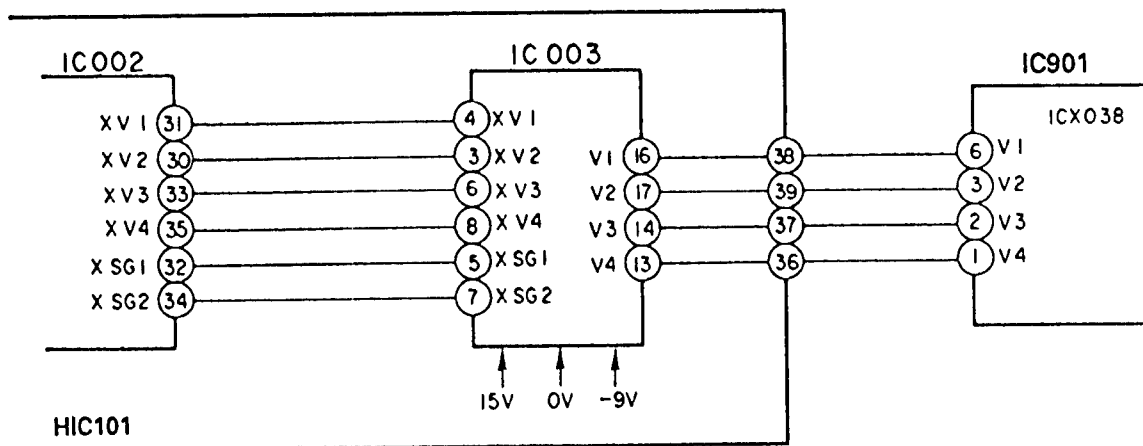


Fig. 1-5

1-2-3. Charge Sweep (Shutter) Pulse and VSUB Control Circuit

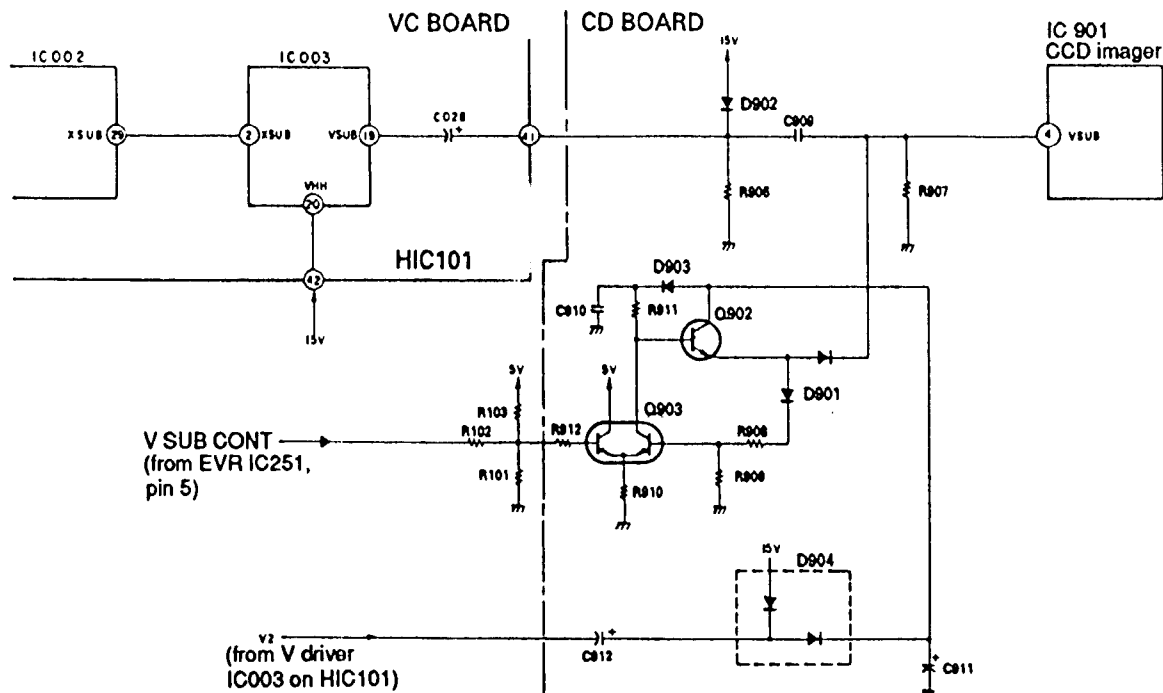


Fig. 1-6

The voltage applied to VSUB of the CCD varies for each CCD and must be adjusted in the range of 9.0 - 18.5 V in 0.5 V increments. (The value is indicated on the reverse side of the CCD by a single letter from E - Z.)

The output from the EVR is matched by R102, R101, R103 to the range and amplified by Q903, Q902 etc. to 9.0 - 18.5 V. The power supply for this operation is approx. 23 V, generated by superimposing the CCD drive pulse V2 on 15 V after integration.

The VSUB pulse from the V driver is clamped on the VSUB output, and the resulting pulse is used as the shutter pulse. The amplitude of the shutter pulse is approx. 24 V (15 + 9 V).

1-2-4. Sync Generator

The sync generator (SG) IC151 generates the following timing pulses necessary for operation of an NTSC camera.

- (1) NTSC sync pulses (HD, VD, SYNC, BLK, FLD)
- (2) Encoder burst flag (BF)

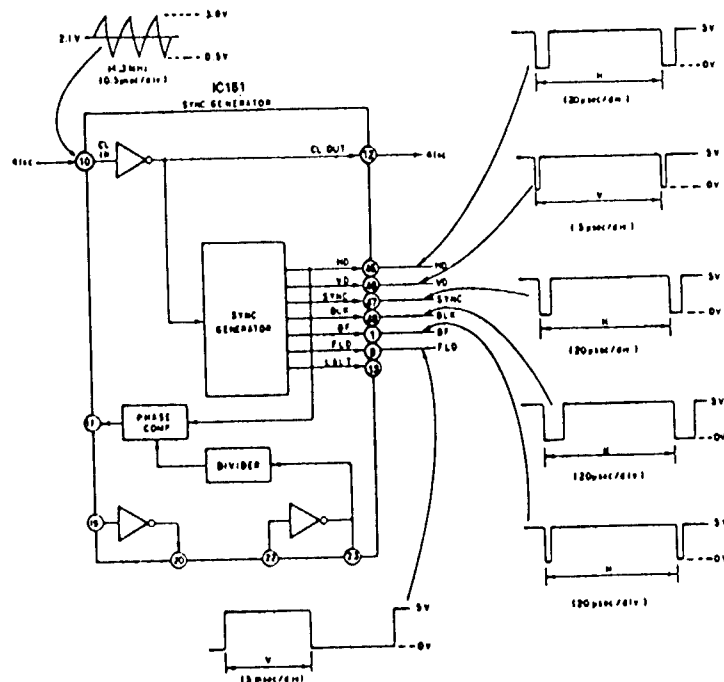


Fig. 1-7

The sync generator also generates the pulse (WND) required for video detection, using a power supply and 4fsc signal. The IC also contains the PLL circuit to produce a subcarrier for operation in PAL mode.

1-2-5. CCD Imager (ICX038AN)

The ICX038AN is a 1/2-inch interline-type CCD solid-state image pickup device. It uses Ye, Cy, Mg and G complementary mosaic color filters and a hole-accumulation diode (HAD) sensor to provide high resolution and high sensitivity. The field sync readout system provides an electronic shutter function with variable charge accumulation time.

Features:

- High resolution, high sensitivity, low dark current
- Continuously variable shutter function
- Low smear
- High anti-blooming capability
- Ye, Cy, Mg, G complementary mosaic color filters

[Device specs]

- Optical size: 1/2-inch format
- Number of effective pixels: 768 (H) $\times$ 494 (V) = approx. 380,000 pixels
- Total number of pixels: 811 (H) $\times$ 508 (V) = approx. 410,000 pixels
- Interline-type CCD image sensor
- Chip size (H $\times$ V): 7.95 $\times$ 6.45 mm
- Unit cell size (H $\times$ V): 8.4 $\times$ 9.8 μ m
- Optical black: Front 3, back 40 pixels in horizontal direction
Front 12, back 2 pixels in vertical direction

- Number of dummy bits: 22 horizontal
1 vertical (even fields only)
- Substrate: Silicon

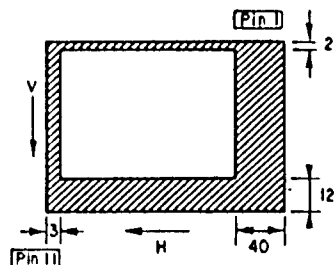


Fig. 1-8 Optical black mapping chart (top view)

[Block diagram and pin assignment]

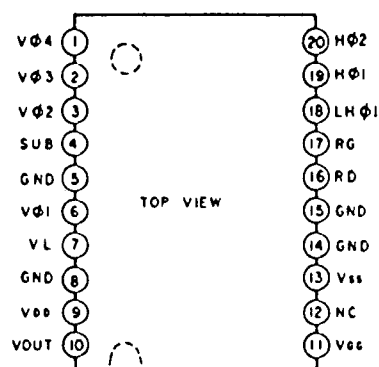


Fig. 1-9 Pin assignment

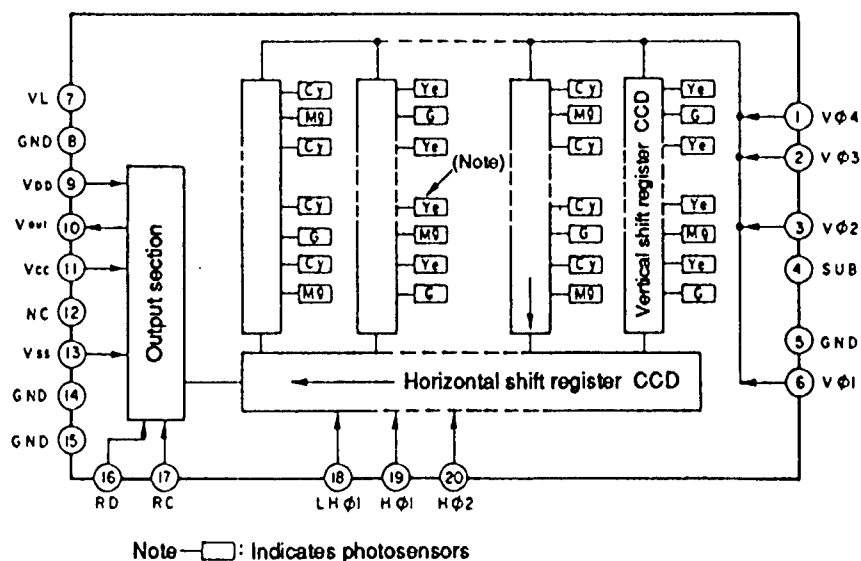


Fig. 1-10 Block diagram

[Pin description]

Pin no.	Symbol	Pin description	Pin no.	Symbol	Pin description
1	V04	Vertical register transfer clock	11	Vcc	Output amplifier gate bias
2	V03	Vertical register transfer clock	12	N. C	
3	V02	Vertical register transfer clock	13	Vss	Output amplifier source
4	SUB	Substrate (overflow drain)	14	GND	Ground
5	GND	Ground	15	GND	Ground
6	V01	Vertical register transfer clock	16	RD	Reset drain bias
7	VL	Protective transistor bias	17	RG	Reset gate clock
8	GND	Ground	18	LH01	Horizontal register last stage transfer clock
9	V _{DO}	Output amplifier drain power supply	19	H01	Horizontal register transfer clock
10	V _{OUT}	Signal output	20	H02	Horizontal register transfer clock

[Pickup device color coding and Y/chroma (color difference) signal configuration]

As the illustration below shows, field reading is performed by combining pairs such as A1 and A2 for field A (B for field B). Therefore, the charge sequence output by the horizontal register (Hreg) for line A1 is [G + Cy], [Mg + Ye], [G + Cy], [Mg + Ye].

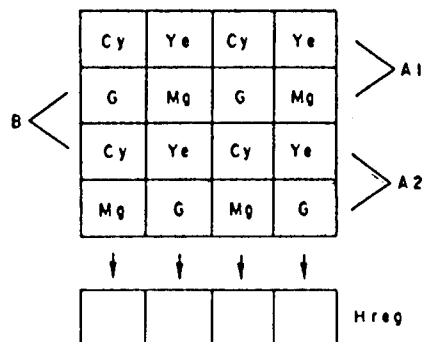


Fig. 1-11 Color coding diagram

To generate the Y signal and chroma (color difference) signal from this output, adjoining pairs are added for the Y signal and subtracted for the chroma signal. Therefore, the following approximated signals are obtained.

$$\begin{aligned} Y &= \{ [G + Cy] + [Mg + Ye] \} \times 1/2 \\ &= 1/2 \{ 2B + 3G + 2R \} \\ R-Y &= \{ [Mg + Ye] + [G + Cy] \} = \{ 2R - G \} \end{aligned}$$

For line A2, the signal output by the horizontal register (Hreg) has the following sequence:

$$[Mg + Cy], [G + Ye], [Mg + Cy], [G + Ye]$$

Therefore the Y signal becomes as follows:

$$\begin{aligned} Y &= \{ [G + Ye] + [Mg + Cy] \} \times 1/2 \\ &= 1/2 \{ 2B + 3G + 2R \} \end{aligned}$$

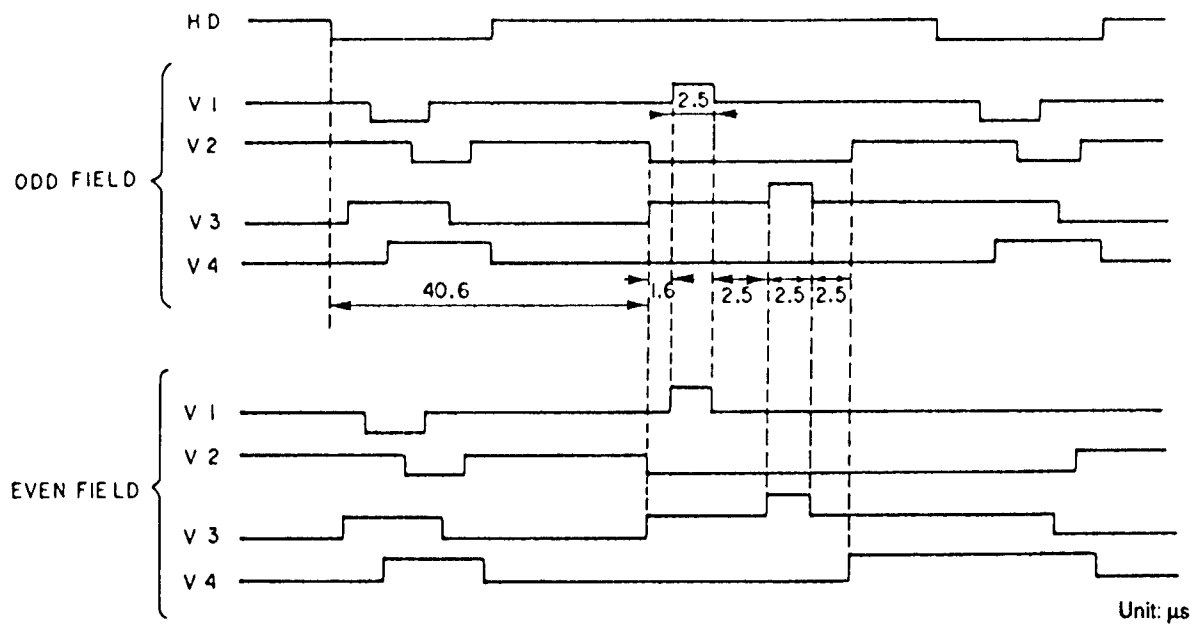
This is the same configuration as for line A1, which is therefore balanced.

The chroma (color difference) signal is approximated as follows:

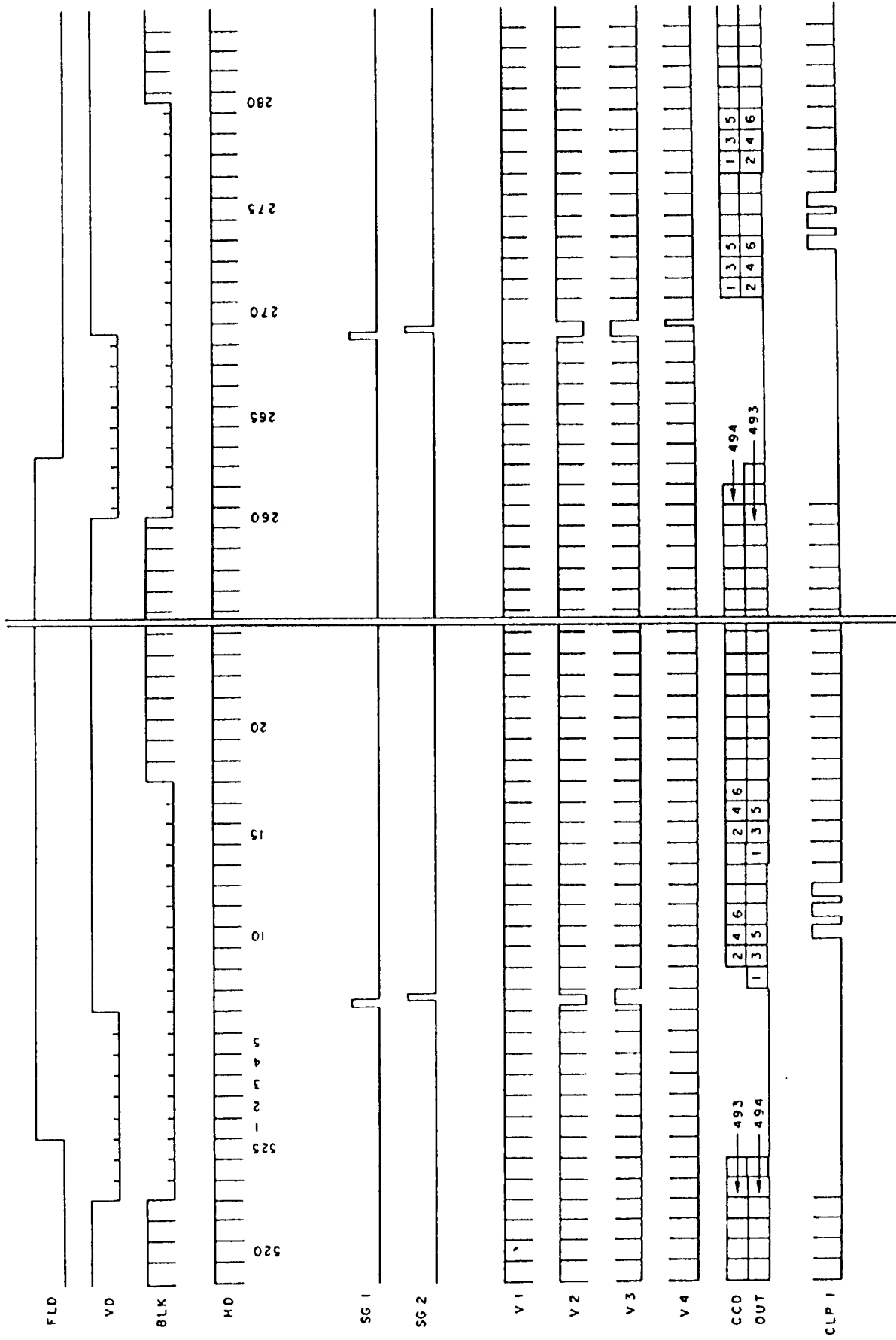
$$\begin{aligned} -(B - Y) &= \{ [G + Ye] + [Mg + Cy] \} \\ &= \{ 2B - G \} \end{aligned}$$

Therefore, the chroma signal consists of $R - Y$ and $-(B - Y)$. Sequentially read out by line. The same applies for field B.

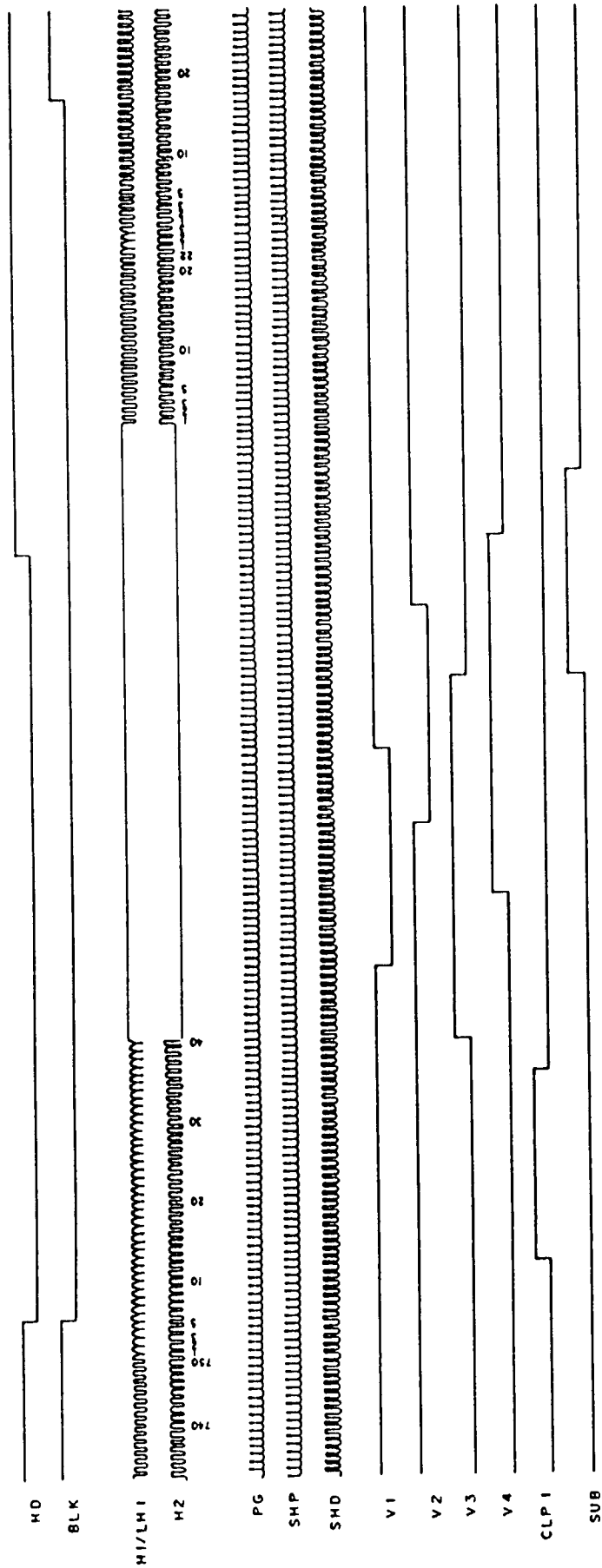
[Sensor readout clock timing chart]



[Drive timing chart (vertical sync)]



[Drive timing chart (horizontal sync)]



1-3. Sample-and-Hold Circuit

[CCD Imager IC901]

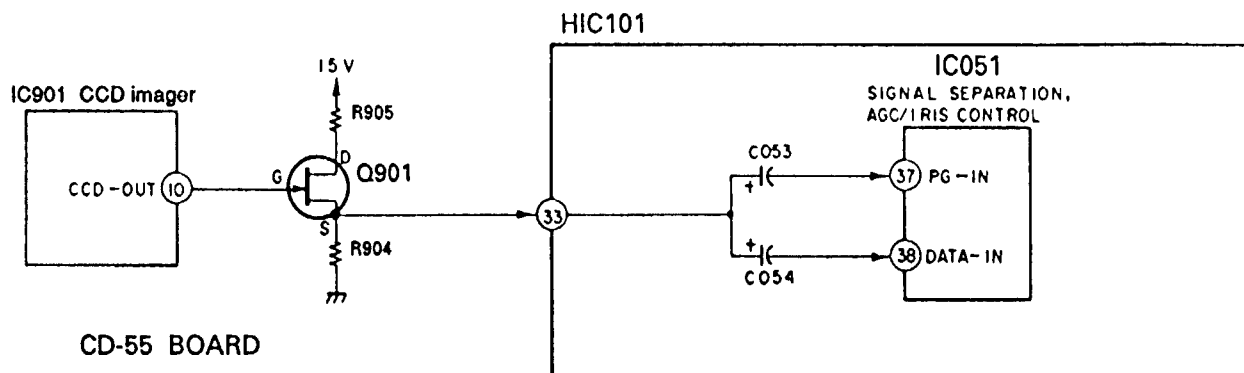


Fig. 1-12

After passing the buffer Q901 which serves to strip DC components, the signal from the imager CCD OUT is fed to pin 37 (PG IN) and pin 38 (DATA IN) of the sample-and-hold IC (IC051).

[First-stage sample-and-hold circuit]

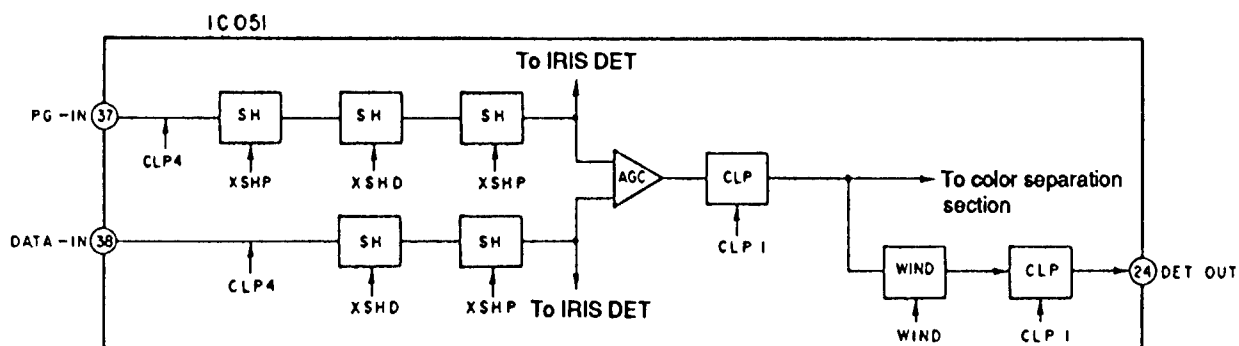


Fig. 1-13

As seen above, the CCD OUT signal is split into two lines, which are both clamped during the blank reset interval at CLP4. The signal from PG IN becomes the PG signal and the signal from DATA IN becomes the DATA signal. (At the input, both signals are identical.)

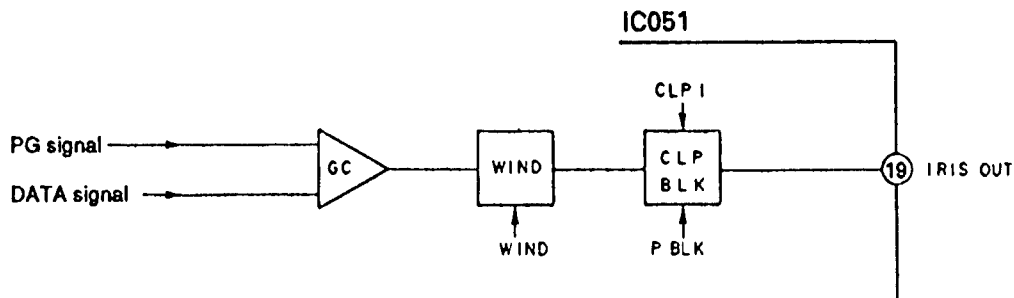


Fig. 1-14

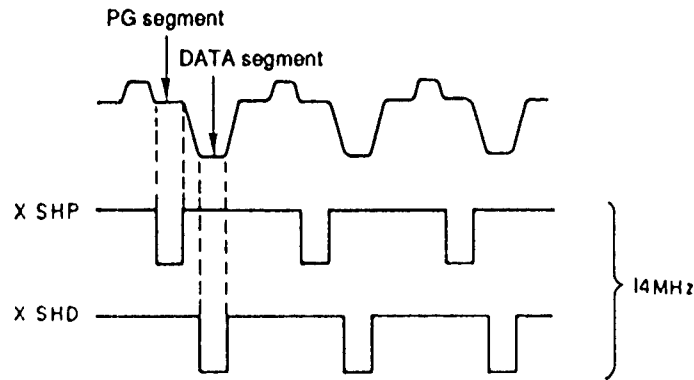


Fig. 1-15

The PG segment of the PG signal is first subject to sample-and-hold at XSHP. The next sample-and-hold operation by XSHD serves for synchronization with the DATA signal portion. Another sample-and-hold at XSHP performs waveform rectification. Then the PG signal is sent to the AGC section.

The DATA segment is subject to sample-and-hold at XSHD and again at XSHP for waveform rectification. The signal is then also sent to the AGC section.

The above two signals are subtracted in the AGC amplifier input stage to implement correlated double sampling (CDS) and to suppress spikes caused by the sample-and-hold operation.

CLP1 clamps the optical black section and sends the result to the color separation section. A blanking line parallel to the main line and windowing is applied, and the result becomes the AGC detection output. The IRIS signal is processed similarly, but it is taken from a point before the AGC output, as shown in the diagram.

[Color separation]

The signal coming from the AGC section consists of two repeated components according to the color coding from the imager. The two components are separated here.

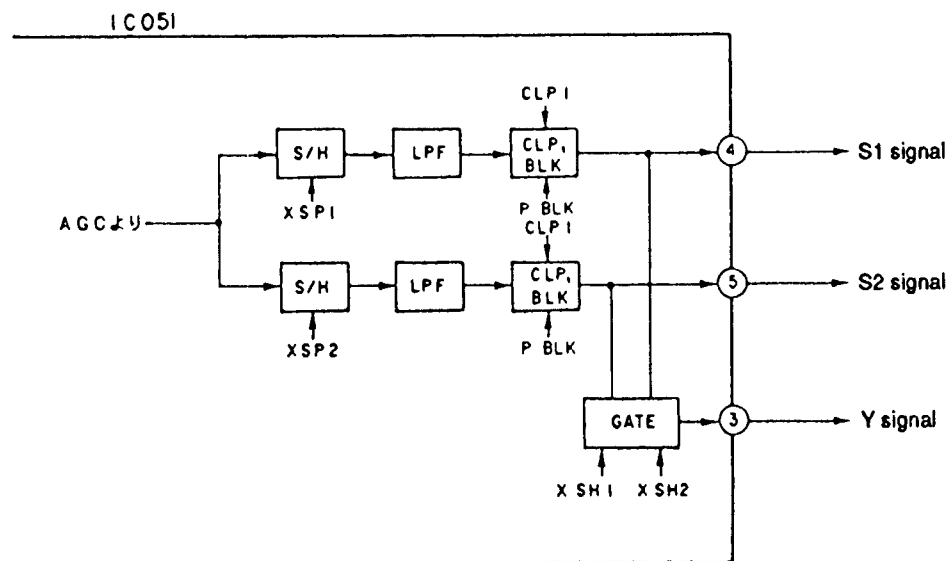


Fig. 1-16

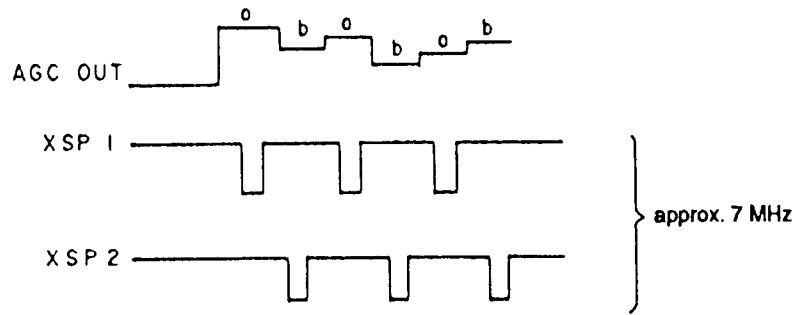


Fig. 1-17

The 14 MHz signal from the AGC contains the coding information in two repeated components (a and b in the above illustration). Two pulses with different phase (XSP1, XSP2) are used to perform sample-and-hold for color separation. After being routed through a low-pass filter to remove spikes, clamping and blanking are again performed and the S1 and S2 signals are then sent to the color processing circuit. If defect compensation has been applied, the sample-and-hold pulses (XSP1 and XSP2) of the corresponding data are not input, therefore the immediately preceding sampling data (voltage) is held.

Because defect compensation may have been applied, the Y signal is produced by switching S1 and S2 with two pulses (XSH1 and XSH2, duty cycle 50%, 7 MHz).

[High luminance tint suppression]

Possible causes for tinting under bright conditions are saturation of the CCD output section or of the subsequent circuitry. In this camera, this is prevented by an OR circuit in IC051 which uses the data signal after initial sample-and-hold and the color-separated S1 and S2 signals to produce a chroma pulse signal. This signal is output from pin 10 (CS OUT) (pin 22 on HIC101) and used by the signal processing section.

1-4. Iris Detection and Drive Circuits

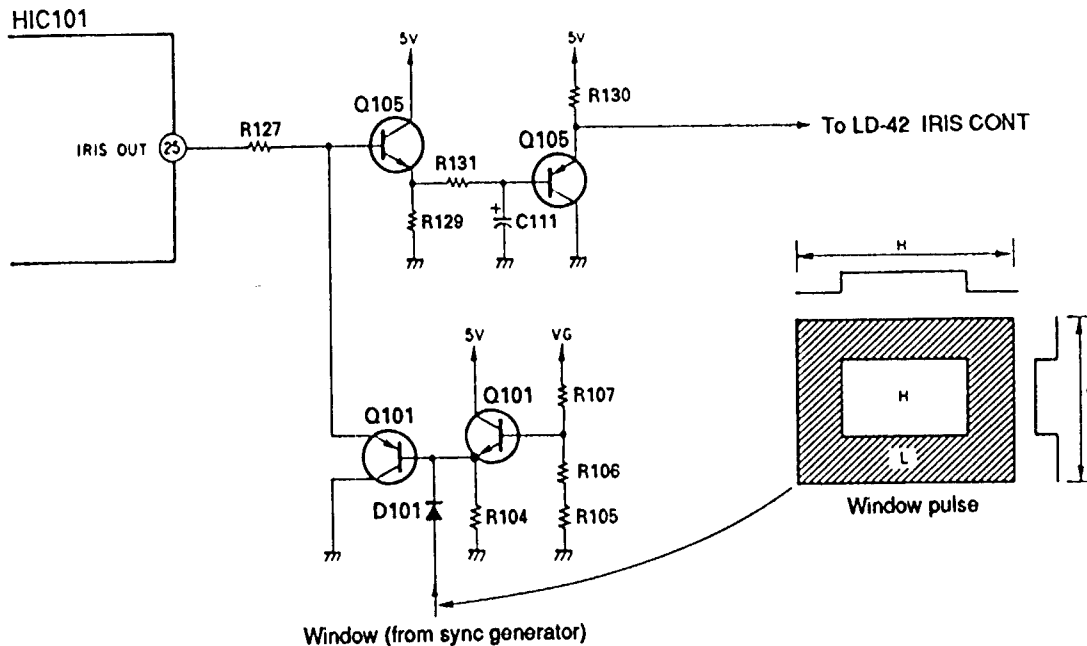


Fig. 1-18

The IRIS OUT signal is detected at Q105 (left transistor) and R129, R131, C111, and output via the buffer formed by Q105 (right transistor). The detection output is controlled so that the outside of the sync generator window pulse does not exceed the voltage determined by R107, R105, R106. This helps to stabilize detection even under difficult conditions such as backlighting.

[Iris drive circuit]

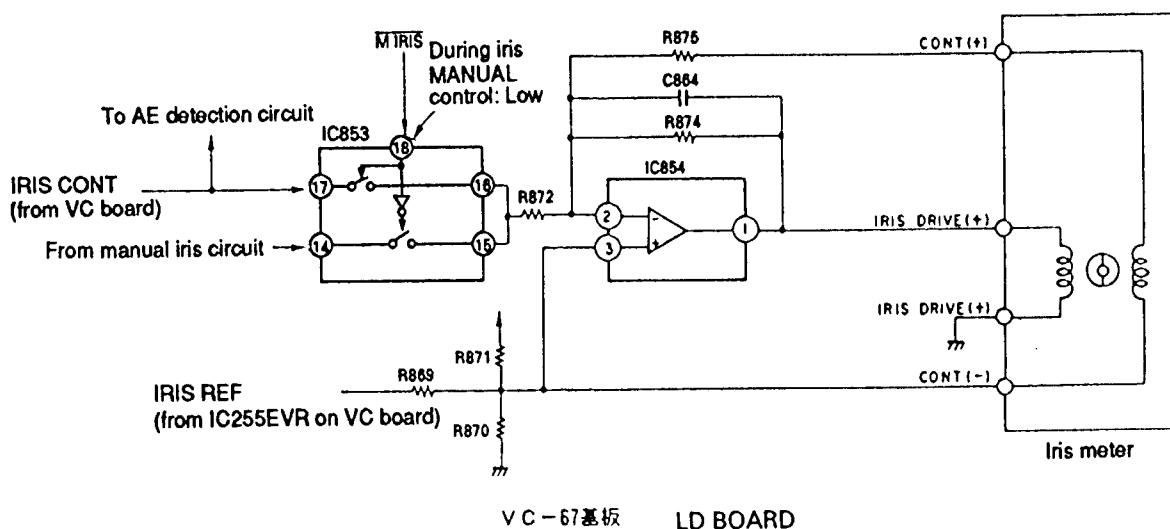


Fig. 1-19

1-5. Chroma Signal Matrix Circuit

1-5-1. C0/Y0 Signal Separation

[Purpose]

In order to produce the R, G, and B signals from the two color-separated signals (here called S1 and S2), the C0 and Y0 signals are required. These signals are extracted by the circuit described in this section.

[Operation]

- 1) The signals S1 and S2 (separated in HIC101) are fed to S1 IN (pin 50 of IC203) and S2 IN (pin 49).
- 2) For a field (m), the S1 and S2 signals are coded by the CCD imager according to the following checker pattern.

line n	line n+1
$S1 = Mg + Cy$	$G + Cy$
$S2 = G + Ye$	$Mg + Ye$

- 3) The C0 signal is obtained by calculating $S2 - S1$, and the Y0 signal by calculating $S2 + S1$.
The C0 signal is calculated as follows.

$$\begin{aligned}\text{line n} \quad C0 &= S2 - S1 = (G + Ye) - (Mg + Cy) \\ &= (G + R + G) - (B + R + G + B) = G - 2B \\ \text{line n+1} \quad C0 &= S2 - S1 = (Mg + Cy) - (G + Cy) \\ &= (R + B + R + G) - (G + G + B) = 2R - G\end{aligned}$$

These signals are obtained alternately for each other line.

The Y0 signal is calculated as follows.

$$\begin{aligned}\text{line n} \quad Y0 &= S2 + S1 = (G + Ye) + (Mg + Cy) \\ &= (G + R + G) + (B + R + G + B) \\ &= 2R + 3G + 2B \\ \text{line n+1} \quad Y0 &= S2 + S1 = (Mg + Ye) + (G + Cy) \\ &= (R + G + R + G) + (G + G + B) \\ &= 2R + 3G + 2B\end{aligned}$$

This means that the same signal is obtained for each line.

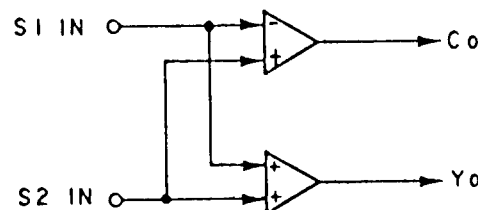


Fig. 1-21

1-5-2. C1 Signal Generation and Synchronization

[Purpose]

As described above, the C0 signal consists of the line sequential signals $G - 2B$ and $2R - G$. Since the signal cannot be used to directly obtain R, G, and B, it is delayed by 1H before processing.

[Operation]

The C0 signal is divided into two lines (one for the delayed and one for the non-delayed signal). One signal passes a low-pass filter to limit the bandwidth which has to be handled by the delay line and is output from pin 46. After capacitance cut by IC201, the signal is input to pin 23 for clamping (CLP3). The sampling clock of the CCD delay line (IC201) uses two phases of 7.16 MHz (XDL1, XDL2). The output appears at pin 14, is buffered by Q204, and after capacitance cut, the signal is input to pin 48 (DLC1 IN). This is the 1H delayed signal, which is called C1 signal.

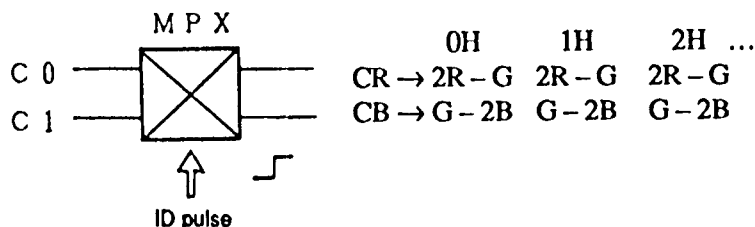
The DC value of pin 47 (C1 GAIN) controls the gain, then clamping is carried out, and the signal is fed to the CLP/MPX circuit along with the non-delayed signal.

After clamping to match the signal levels, synchronization is performed by the MPX circuit (CLP2).

[Synchronization]

	0H	1H	2H
C0 signal	$G - 2B$	$2R - G$	$G - 2B$
C1 signal	$2R - G$	$G - 2B$	$2R - G$
ID pulse			

The C0 and C1 signals are composed as shown above. When these signals are inverted by the ID pulse for synchronization with H, the following results.



In this way, the CR and CB signals are obtained.

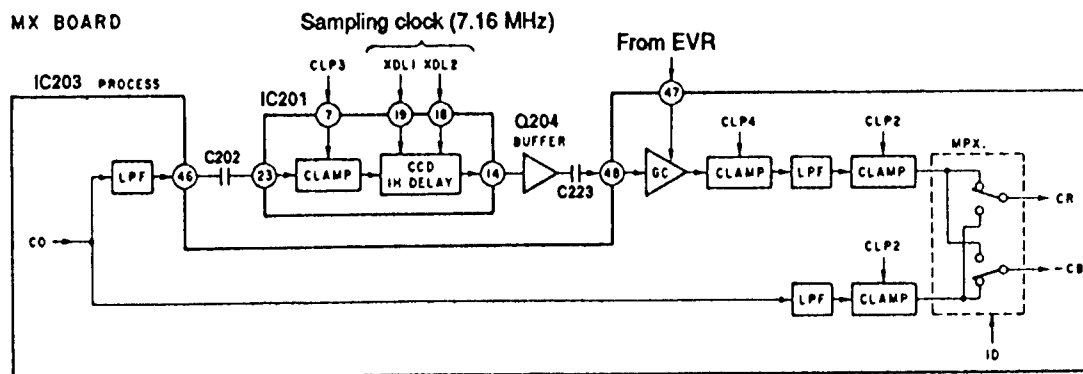


Fig. 1-22

1-5-3. YL Signal Generation

In order to calculate R, G, and B, the YL signal is required in addition to the CR and CB signals.

The Y0 signal gained by adding S2 and S1 is output from pin 52 of IC203, passes C204 and is input to pin 3 of IC201 (CCD delay line). After clamping (CLP3) and 1H delay by XDL1 and XDL2, it is output from pin 11. Via the buffer Q203 and C219, the signal is input to pin 55 of IC203.

Here gain adjustment is performed to compensate for losses in the CCD delay line, and the resulting signal is Y1. Y0 and Y1 are averaged (added and divided by 2), and the result is the YL signal

$$Y_L = \frac{Y_0 + Y_1}{2}$$

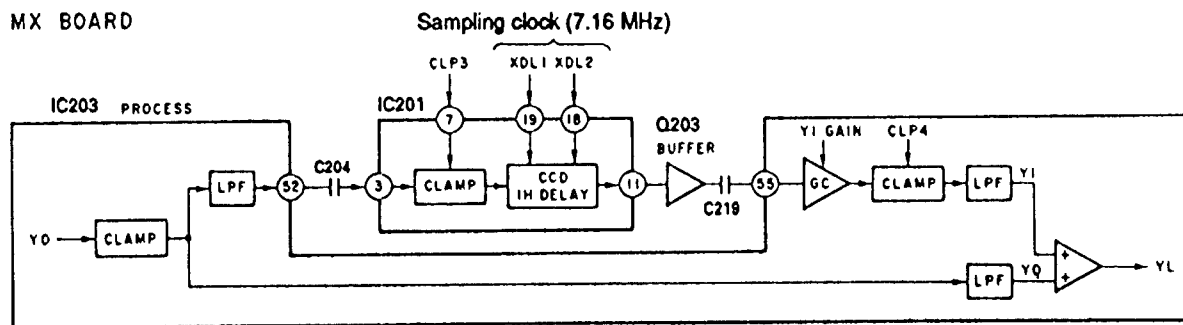


Fig. 1-23

1-5-4. RGB Matrix Circuit

[Purpose]

This circuit produces the R, G, and B signals necessary for primary color signal processing from the CR, CB, and YL signals.

[Operation]

From the signals CR, CB and CL (obtained as described in the preceding sections), the circuit produces R, G, B according to the following equations.

$$\begin{cases} R = CR + \alpha Y \\ G = Y - CR - CB \\ B = CB + \beta (Y - CR) \end{cases} \quad \alpha \text{ and } \beta \text{ are externally variable constants.}$$

- * If the Ye, Cy, G, and Mg signals from the imager are ideal, the constants α and β can be determined easily. In practice, the CCD spectral differentiation is not ideal, and the constants therefore can only be determined based on experience.

1-6. White Balance Amplifier to γ (Gamma) Circuit

[Purpose]

This circuit block executes processing from white balance adjustment to γ circuit input.

[Operation]

After the gain of the R, G, and B signals has been set, white balance is adjusted, using G as a reference. The white balance amplifier has two stages. The first stage is a pre white balance (preset) circuit, and the second stage is the white balance amplifier (which drives the AWB circuit).

After the white balance section, each signal is routed through a low-pass filter which serves to limit the bandwidth of the color difference signal (chroma signal with 3.58 MHz modulation). Bandwidth limiting at this stage prevents the possibility of a false chroma signal that may be generated in the subsequent γ circuit and color difference signal matrix. The low-pass filter is followed by a clamping circuit to match the levels and split the signal in two streams. The first is the output for auto white balance. (The clamp DC level is also output.) The other is the main signal line which is input to the γ circuit via a C-slice circuit where low-level noise is cut off. (The γ circuit also has three channels for R, G, B.)

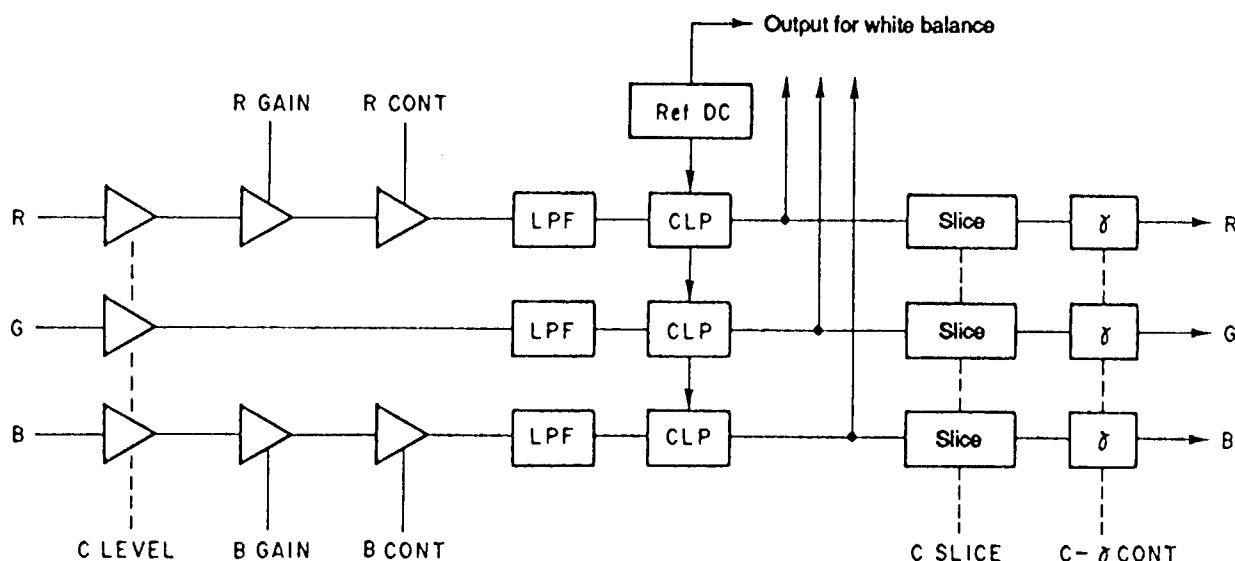


Fig. 1-24

1-7. Color Difference Signal Matrix Circuit

[Purpose]

This circuit produces the color difference signal for the 3.58 MHz modulated chroma signal required for the NTSC system.

[Operation]

The R, G, B signals output by the γ circuit are first made into R - G and B - G signals. The color difference signal is then obtained by the calculation given below.

$$R - Y = \frac{0.7 (R - G) - 0.11 (B - G)}{1.14}$$

$$B - Y = \frac{-0.3 (R - G) + 0.89 (B - G)}{2.03}$$

To adjust color reproducibility, the signal is passed through a matrix comprised of

$$R - Y_{out} = G1 \{ (R - Y) + \alpha (B - Y) \}$$

$$B - Y_{out} = G2 \{ (B - Y) + \beta (R - Y) \}$$

where

$$G1 = R - Y_{Gain} \quad \alpha = B - Y_{Hue}$$

$$G2 = B - Y_{Gain} \quad \beta = R - Y_{Hue}$$

Finally, the signals are adjusted by EVR.

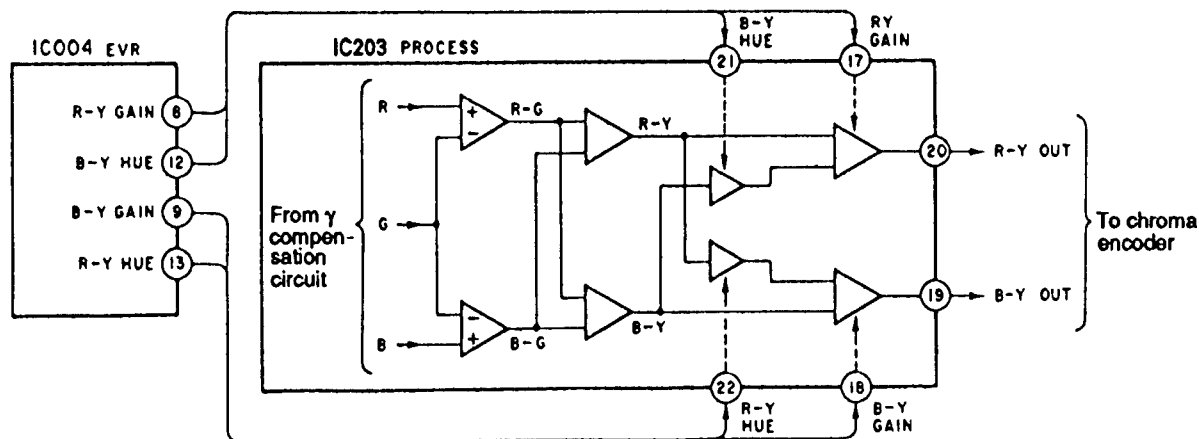


Fig. 1-25

The resulting B - Y and R - Y signals are output from pins 19 and 20 of IC203.

1-8. Chroma Encoder

After removing DC components in the color difference signal by a capacitor, the signal is fed to pins 47 and 1 of the encoder IC254.

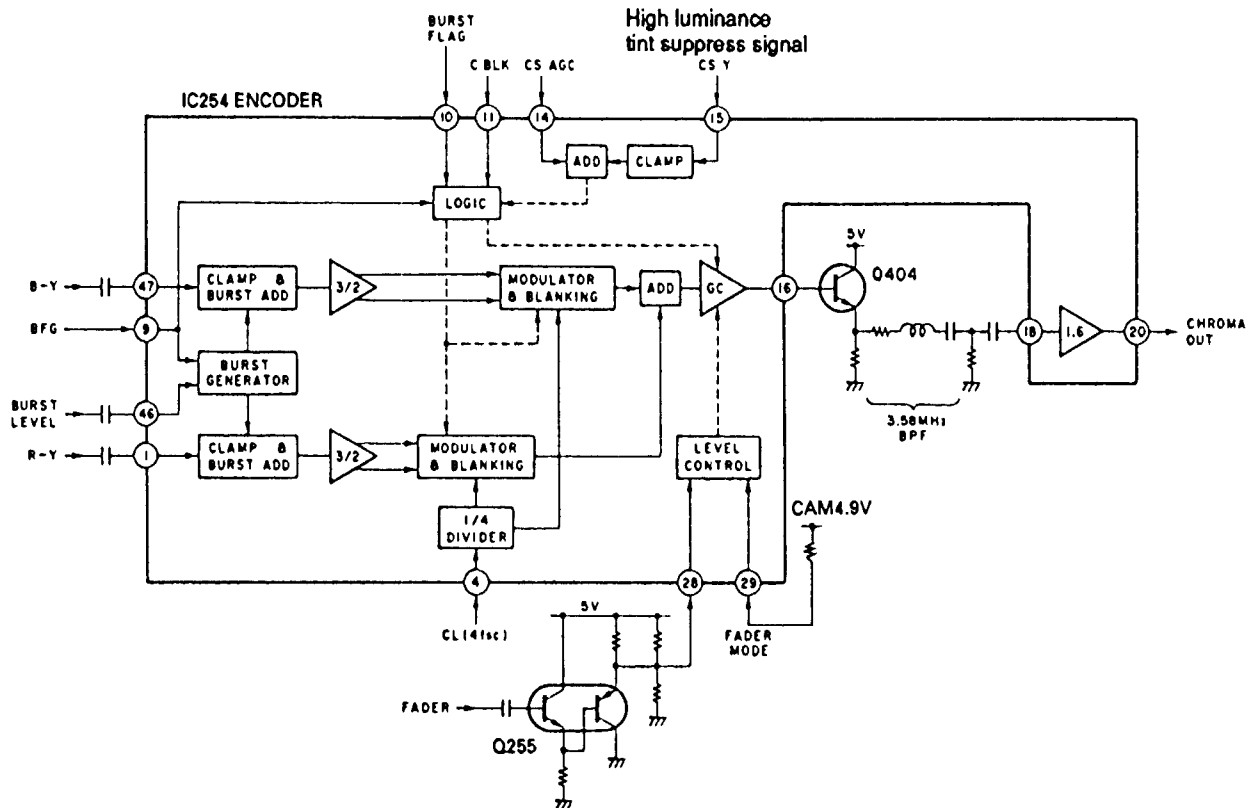


Fig. 1-26

The B - Y (R - Y) signal input to pin 47 (pin 1) is clamped, and after adding a burst, it is supplied to the modulator. Here the color difference signal is modulated with fsc. The phase of the modulation carriers for B - Y and R - Y differs by 90°. The modulated signals are added to produce the modulated chroma signal. Various control amplifiers for fader, chroma suppress Y, chroma suppress AGC etc. follow, and the output appears at pin 16. The signal then is routed through a band-pass filter. Since this causes a gain loss, the signal is returned to pin 18 for amplification and output from pin 20. The band-pass filter serves to prevent harmonic distortion during modulation.

1-9. Y Signal Block

This section describes the Y signal circuit after the AGC block.

1-9-1. HIC101, pin 18 to IC203, pin 64

The Y signal output from pin 18 of HIC101 passes FL201 and FL202 and is input to pin 64 of IC203. FL201 is a low-pass filter with a 7.16 MHz trap, designed to remove the 7.16 MHz coding carrier. Bandwidth limiting at this stage is very important because the signal next passes a CCD delay line.

FL202 is a delay line which serves to match the Y/C delays. These can be adjusted only at this point.

1-9-2. IC203, pin 64 to IC203, pin 5

The Y signal from FL202 is fed to pin 64 of IC203, where it is clamped before entering the γ circuit. The γ curve can be controlled (from the EVR) by means of the DC value at pin 63. After the γ circuit, the signal is output from pin 4 of IC203 and fed to pin 1 of IC202 which forms a 1H CCD delay line operating with a 14 MHz clock. The 1H delayed signal is output from pin 3, passes the buffer Q201 and FL203, and is returned to pin 2 of IC203. In IC203, the gain loss caused by the delay line is compensated. The signal is then output as YH OUT1 from pin 5.

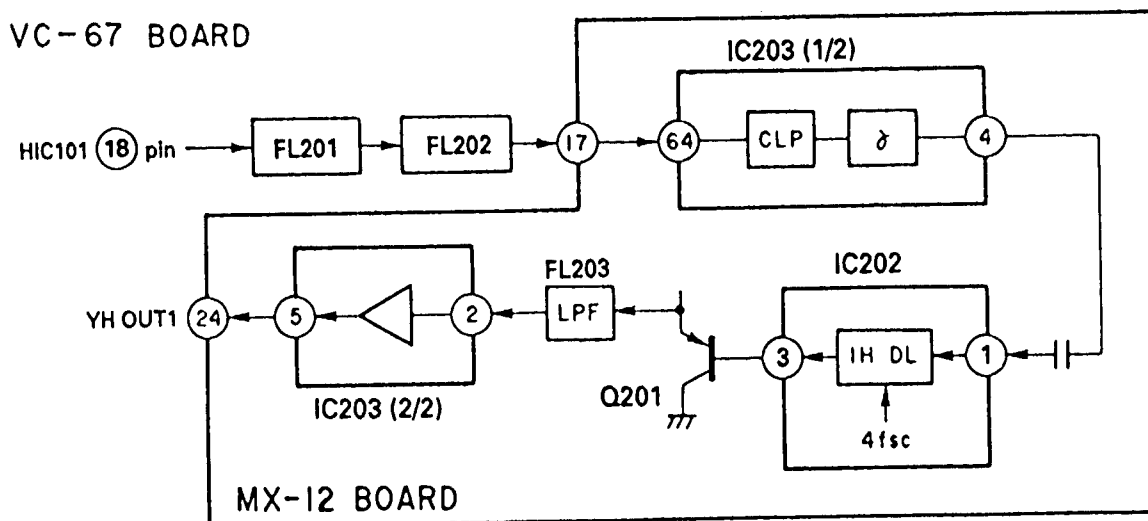


Fig. 1-27

FL203 serves to eliminate harmonic distortion generated when passing the CCD delay line and to accurately match 1H.

1-9-3. VC Board

The Y signal is divided into two lines. One is used for H aperture correction and the other is the main line. The main line passes FL252 which is a delay line that serves to match the delay caused by the H aperture correction circuit. The result is input to pin 40 of IC254 (encoder). The reason for separating the main line and H aperture correction line is to preserve good frequency response for the main signal, where the delay line is used as a termination.

[Encoder IC254]

After clamping, the Y signal is combined with the H aperture correction signal and the YL - YH (V aperture correction) signal. The combined Y signal passes an amplifier for Y level control and fader control (Y level: pin 30, fader: pins 28, 29). This enables DC control which is carried out by the EVR and microprocessor.

Next, the Y signal is clamped to the setup level and passes the white clip circuit (DC control at pin 24). The resulting output with synchronization and setup appears at pin 22.

R281 and R282 serve for matching with the video ICs. Then the signal is converted to 0.5 V_{p-p} and output via the buffer Q253.

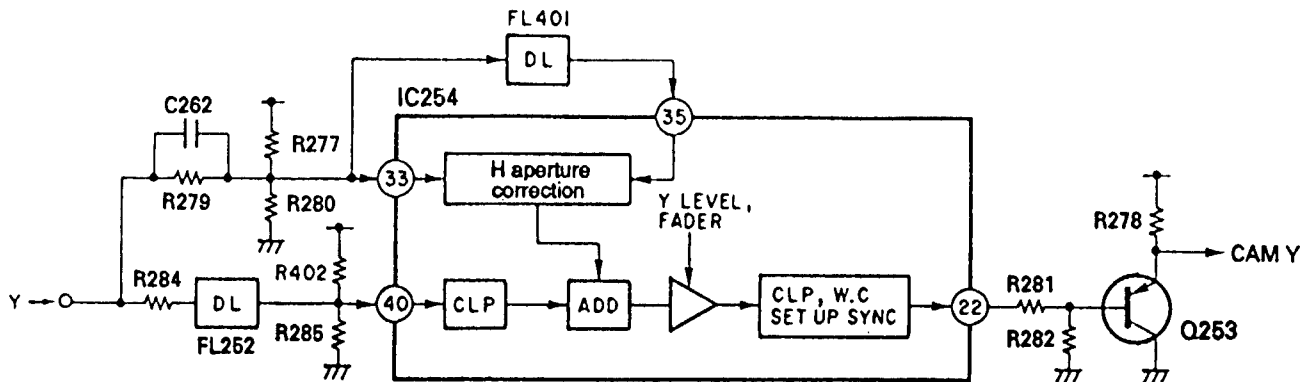


Fig. 1-28

1-9-4. H Aperture Correction Circuit

This circuit provides H aperture correction that is required to improve high-frequency response. The block diagram of the circuit is shown below.

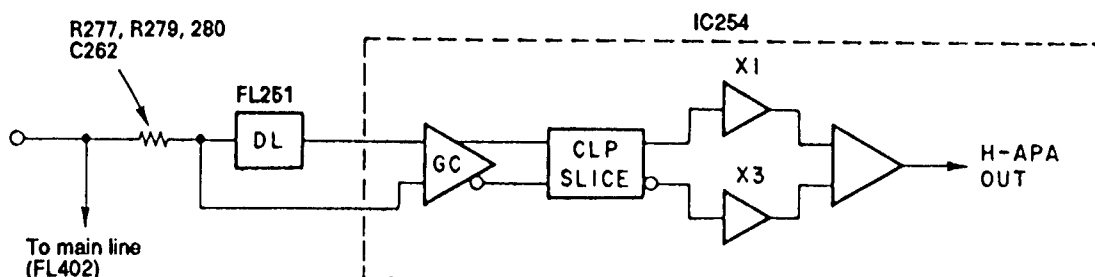


Fig. 1-29

The DL (FL251) section in Fig. 1-27 has the effect of the equivalent circuit shown below, where t is the delay time of the delay line.

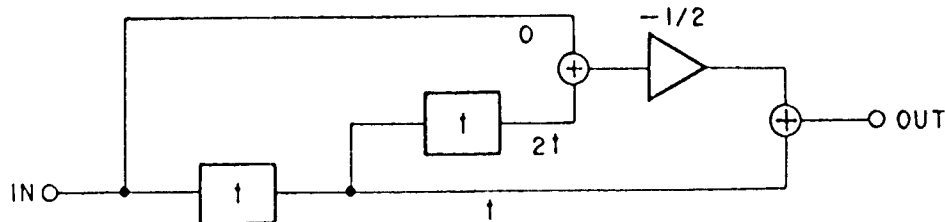


Fig. 1-30

The input/output characteristics of this circuit amount to a bandpass filter with a peak frequency of $1/2t$ when the delay $= t$.

The signal split off from the main line passes the filter shown above and is gain controlled and sliced to give it a high/low ratio of 1:3. The resulting signal, called the H aperture correction signal, is again fed into the main line.

1-9-5. V Aperture Correction Circuit

V aperture correction is realized on board MX-12 using the color-separated S1 and S2 signals (IC203, pins 50 and 49).

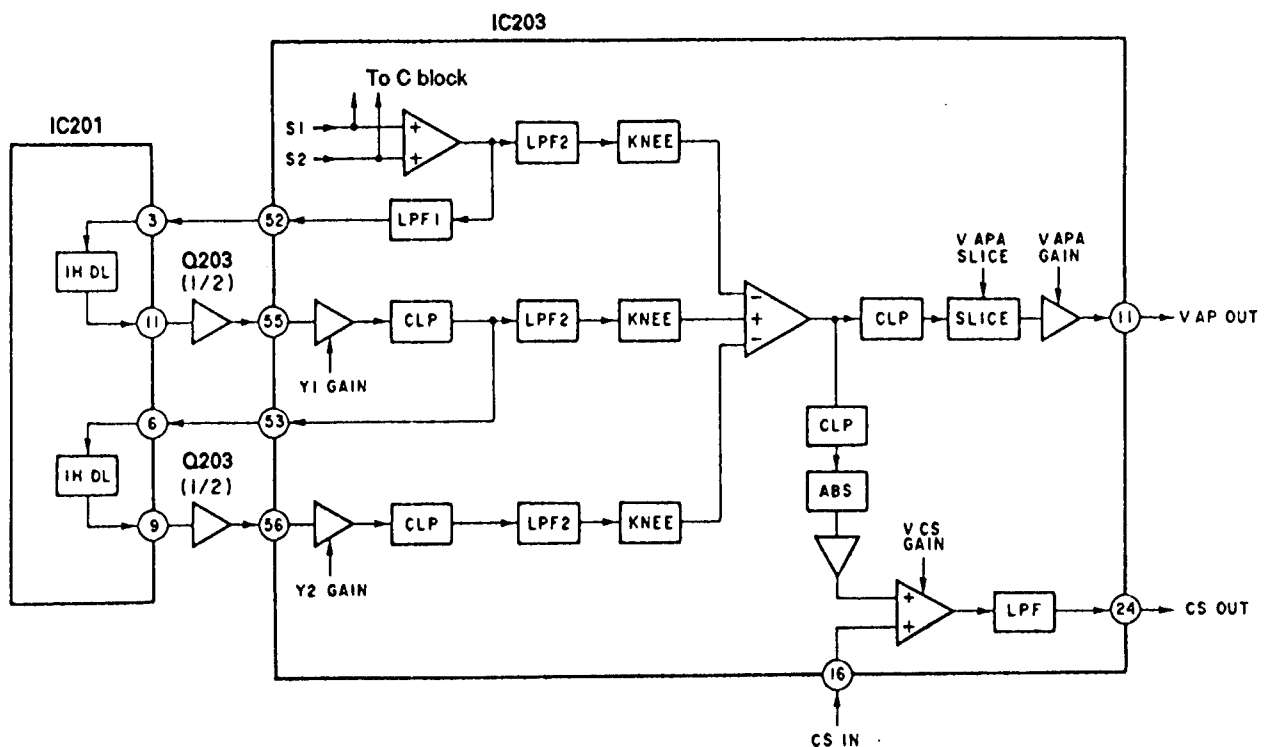


Fig. 1-31

Although two 1H delay lines are used to produce the V aperture signal as shown in the block diagram, the basic principle is the same as for H aperture correction.

A difference lies in the use of a knee circuit that is inserted before arithmetic processing.

The purpose of this circuit is to prevent false signals caused by circuit saturation under high luminance conditions. The circuit also produces a signal from the absolute value of the V aperture correction. This signal is mixed with the CS signal and prevents false chroma signals attached to the vertical edge in the encoder.

The V aperture correction signal passes FL204 which serves to match the delay to the overall Y/C delay. The signal then is fed to pin 42 for mixing with the main line signal.

1-10. Hall Amplifier

A Hall element is used to detect the absolute iris position. The element is located in the iris meter and detects changes in the magnetic field of the magnet that drives the iris. The output of the Hall element is correlated to a given voltage (1 - 3.5 V), in order to determine the iris position.

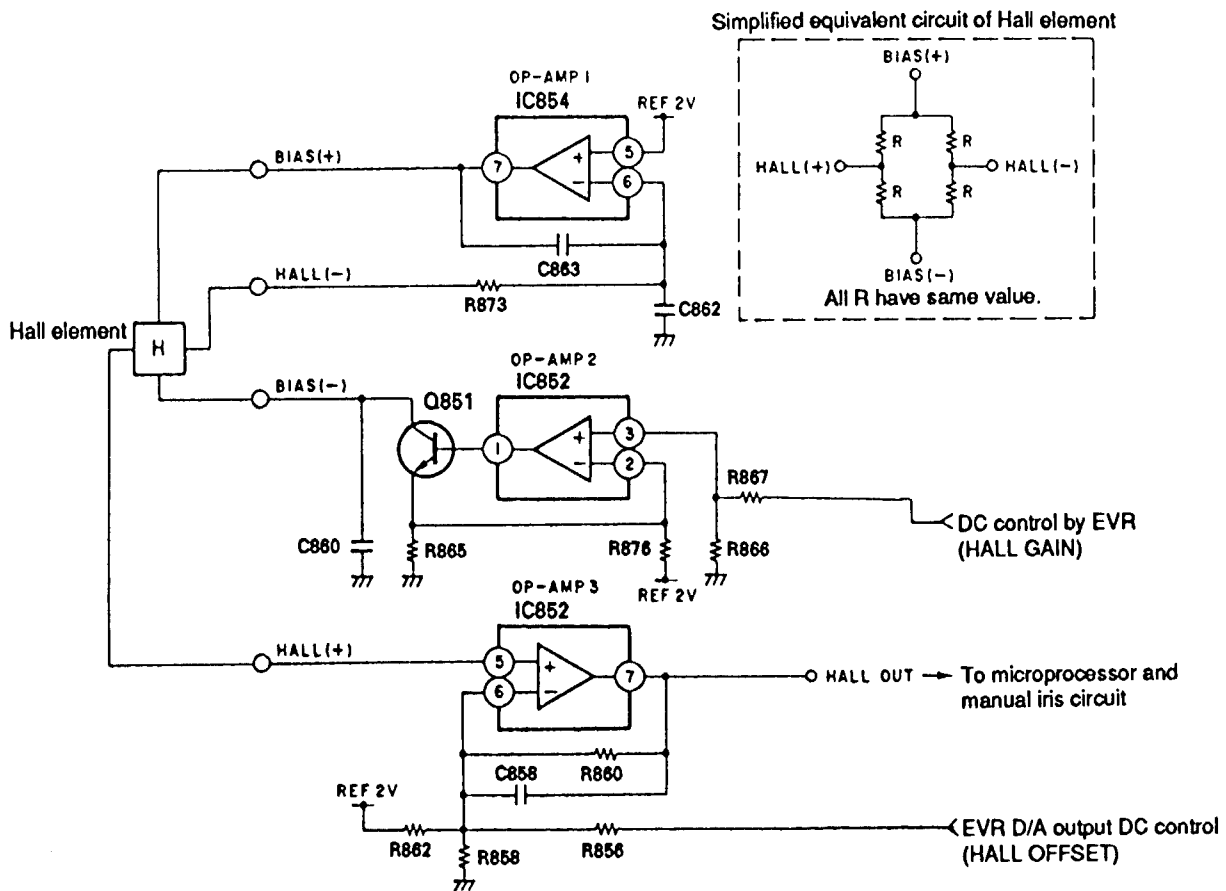


Fig. 1-32

The circuit consisting of OP-AMP 1 ensures that the negative side of the Hall element is always Ref 2 V. As a result, the Hall output is maintained at approx. 2 V on both the negative and positive sides, regardless of the current.

The circuit configured around OP AMP 2 varies the current that flows in the Hall element. In response to a DC value given by EVR, a constant current is supplied to the Hall element. Unlike conventional systems, the amplifier gain of the Hall output is fixed so that the gain is determined by the current that flows in the Hall element.

OP AMP3 serves as the Hall element output amplifier. As described above, the gain is constant, but an offset can be added by EVR.

The open to close positions of the iris are matched to 1 V - 3.5 V by the Hall gain and EVR offset. The value is A/D converted, so that the microprocessor can determine the iris position.

Manual Iris operation

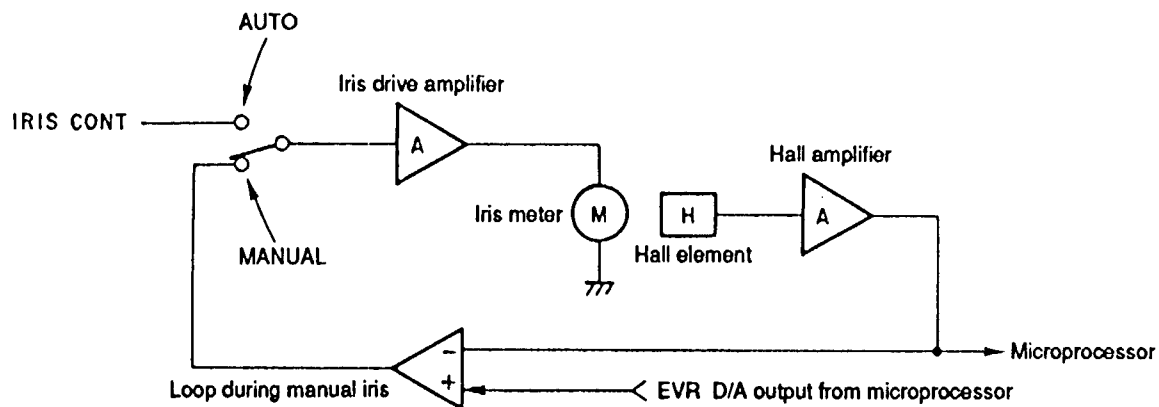


Fig. 1-33

The general operation principle is as outlined above, but minor compensation and adjustments are required in actual operation. These are implemented by microprocessor software.

1-11. Focus System

Thanks to the inner focus system used in this camera, auto focus is possible already from the macro range.

1-11-1. Auto Focus

Compared to conventional auto focus systems, the CCD-TR81 has the following distinguishing characteristics.

1. V peak detection principle
Unlike conventional systems, where all edge components in the AF measurement frame are integrated, the V peak detection principle detects only one edge component in the frame.
2. Variable frame
The AF measurement frame size is not fixed but can be varied over a wide range.

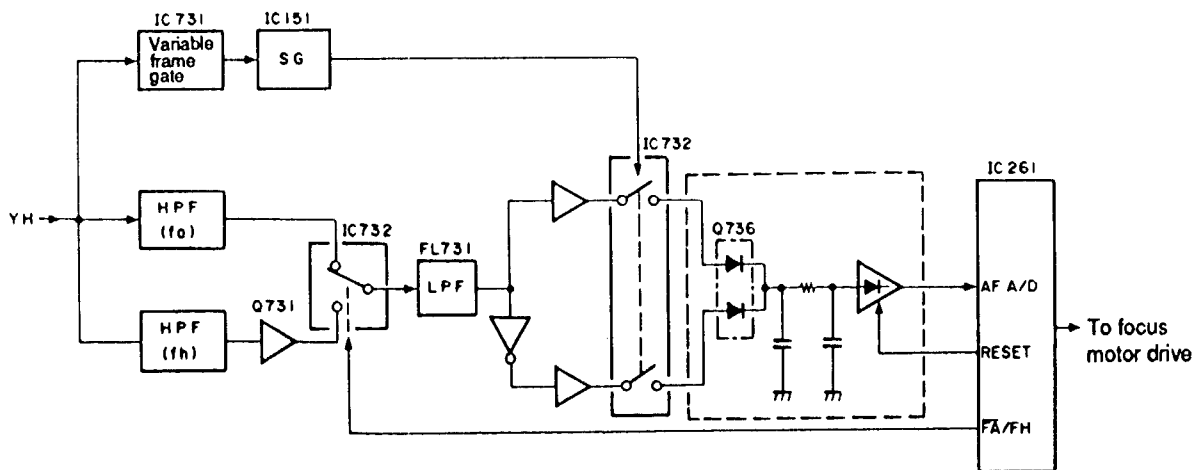


Fig. 1-34 Auto focus block diagram

[AF modes]

The following seven AF modes are available.

- Startup mode
Quickly brings an unfocussed picture into focus.
- Back mode
Activated when the motor in startup mode has moved in the opposite direction of the focal point.
- Low-speed search mode
Activated in the vicinity of the focal point.
- Ultra low-speed search mode
Activated when the focal point has been reached in low-speed search mode.
- High-speed search mode
Activated during zoom-up operation.
- Stop mode
Activated when the ultra low-speed search mode has continued for 3 seconds.
- Large frame mode
Activated when the focal cannot be found although startup mode and back mode are alternately repeated.

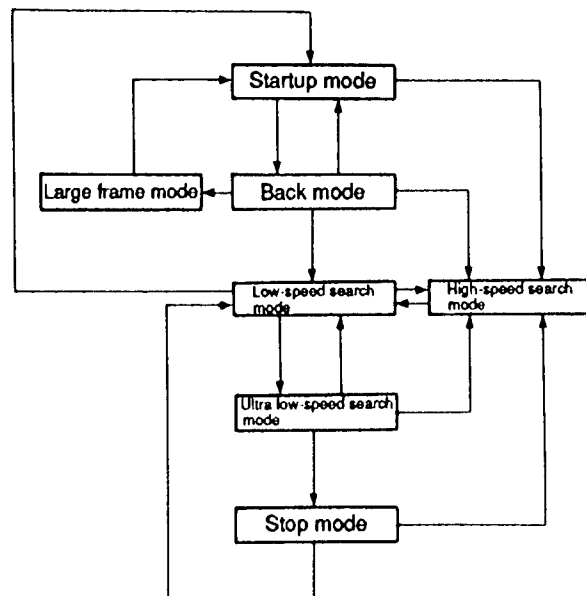


Fig. 1-35

[Generation of evaluation value (AF A/D)]

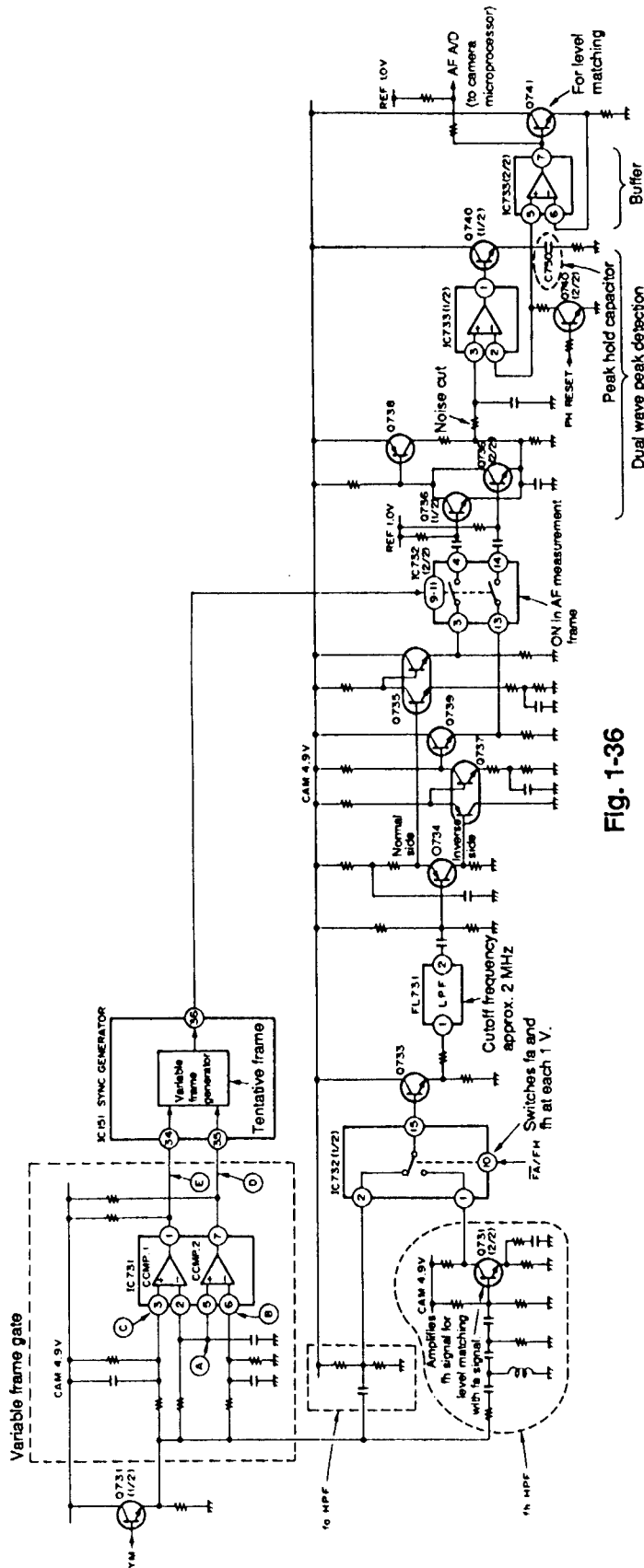
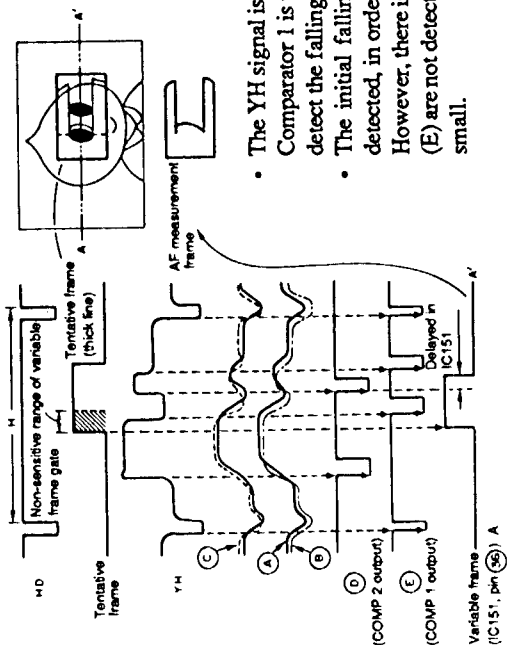


Fig. 1-36

(1) Variable frame gate: Serves to allow easy focussing on a desired object.



(2) Dual-wave peak detection

The high-frequency components which passed through the gate in IC732 (2/2) are detected by Q736 for the normal and inverted side. In IC733 (1/2), the amplitude of the high-frequency components is converted into a DC level. Q740 (2/2) goes ON for each 1H and discharges C750.

- The YH signal is passed through a low-pass filter with different characteristics. Comparator 1 is used to detect the rising edge components and comparator 2 to detect the falling edge components in the picture.
- The initial falling edge components (D) and (E) in the tentative frame are detected, in order to generate the AF measurement frame. However, there is a non-sensitive range where falling edge components (D) and (E) are not detected. This keeps the AF measurement frame from becoming too small.

1-11-2. Manual Focus

Since this camera uses the inner focus principle, directly moving the focus lens with the focus ring is not possible. Instead, photointerrupters on the focus ring are used to detect rotation speed and direction. The results are fed to the camera microprocessor which controls the focus drive motor to allow manual adjustment.

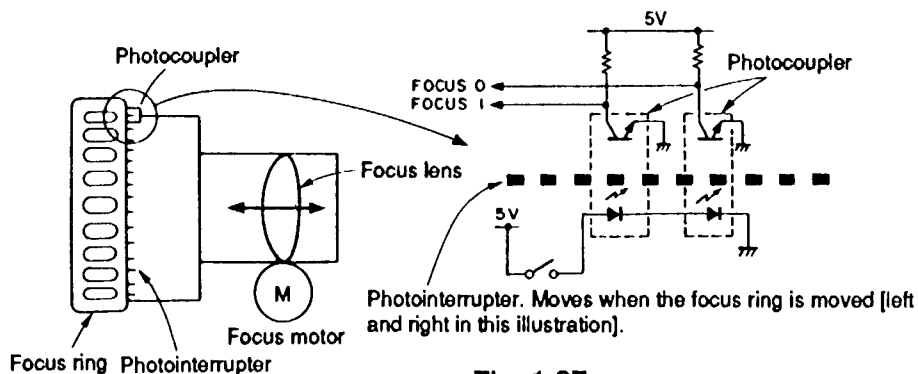


Fig. 1-37

Two photointerrupters are mounted on the focus ring so that their output is phase shifted by 90°. This allows detection of the rotation direction.

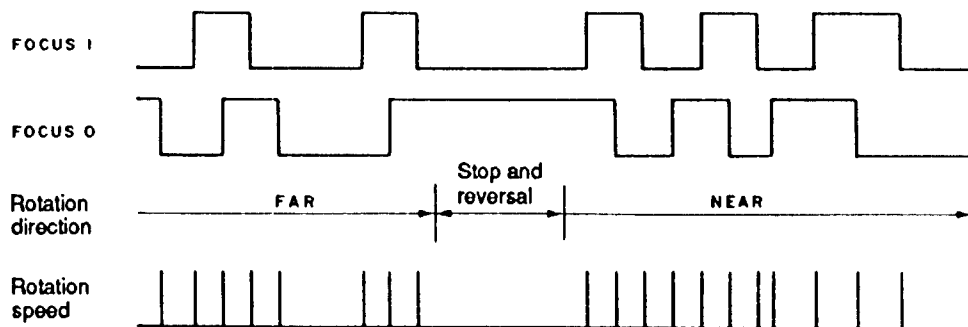


Fig. 1-38

[Detection of focus ring rotation speed and direction]

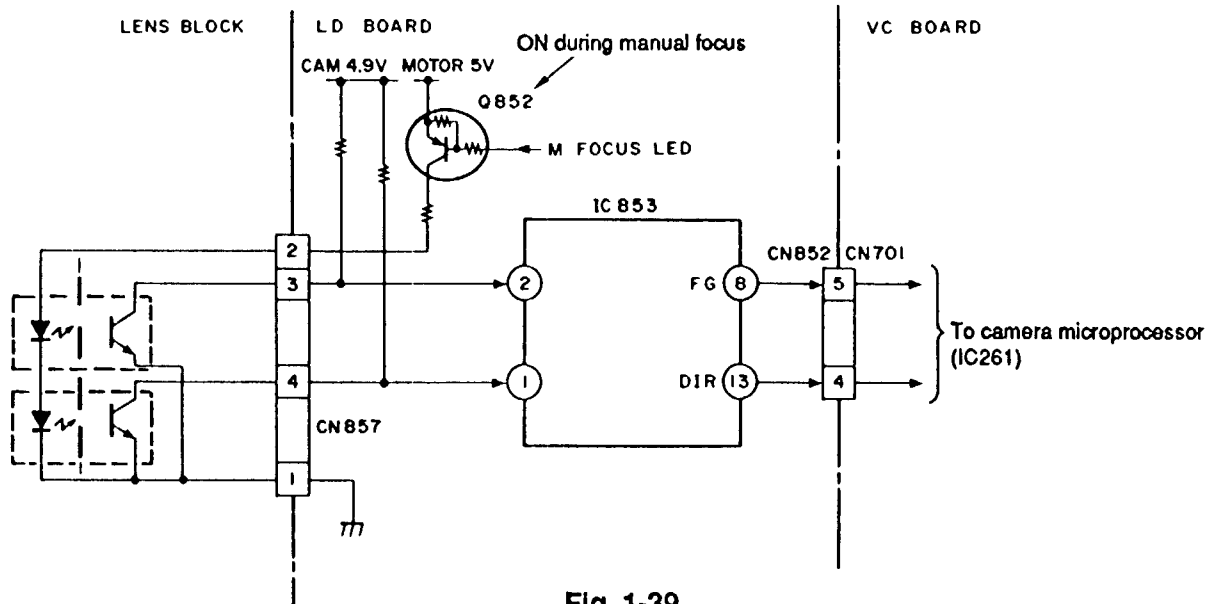


Fig. 1-39

The focus transistors on the lens block send signals to IC853 which are used to detect focus ring rotation speed and direction. The result is then supplied to the camera microprocessor.

1-11-3. Focus Motor Drive Circuit

This camera employs a stepping motor for focus drive. To ensure silent operation, sine wave drive is used.

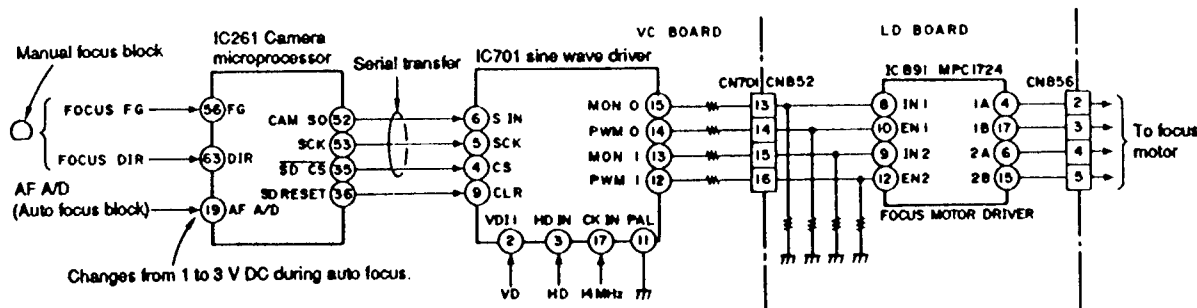


Fig. 1-40

Data about the rotation speed and direction of the focus motor (stepping motor) are sent in serial form to IC701 (pre-driver). Here a pulse modulated sine wave output (pins 12, 14) and a DC output to determine the current flow direction (pins 13, 15) are generated and sent to IC891 (stepping motor driver) for actual motor control.

1-11-4. Focus Lens Position Initializing

When the camera is turned on (lock → standby), the focus lens is reset to the initial position. The focus position after initializing is detected by the microprocessor by counting the number of steps of the stepping motor.

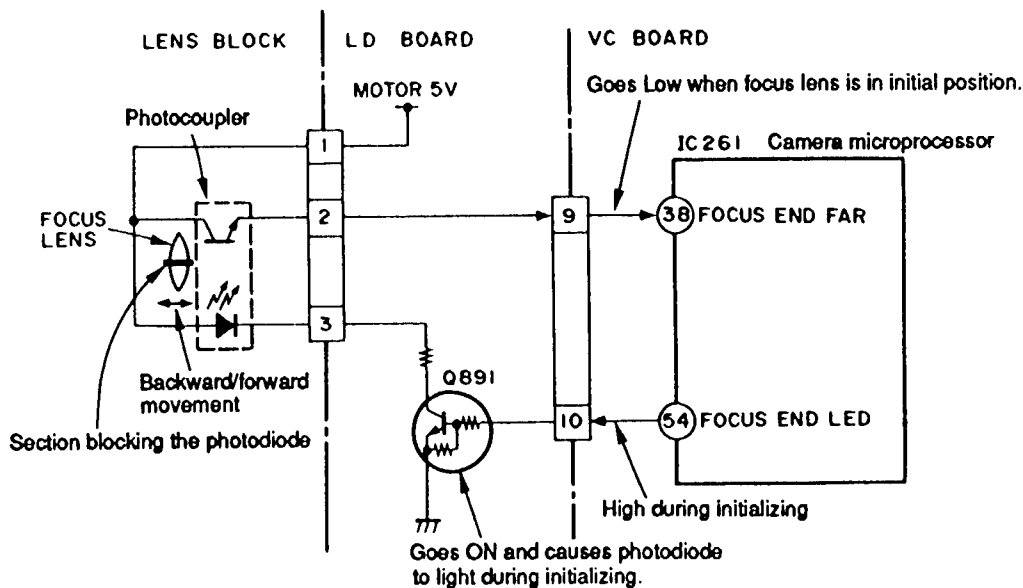


Fig. 1-41

1-12. Zoom System

The power zoom of this camera uses digital servo, in order to achieve smooth zoom motor movement with fast zooming in the WIDE range and slow zooming in the TELE range.

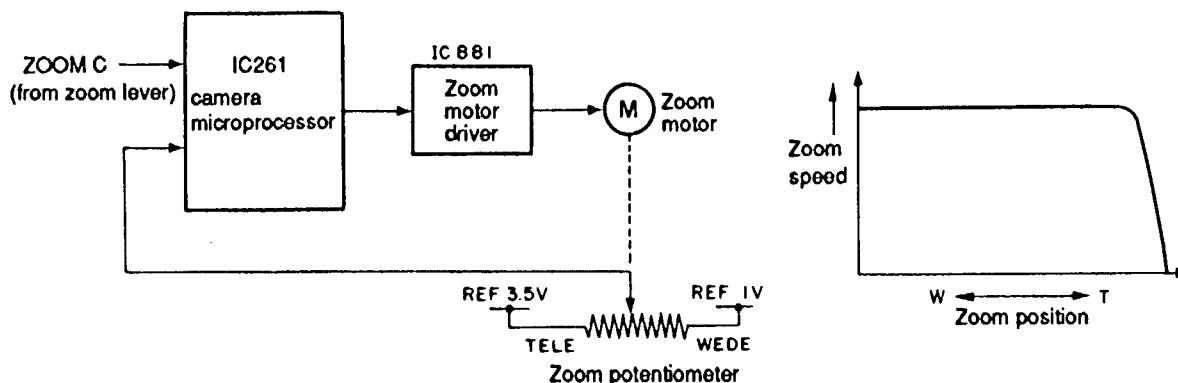


Fig. 1-42

1-12-1. Zoom Potentiometer Readout

In order to achieve correct zoom tracking, the zoom position must be detected accurately.

Zoom tracking: When the zoom position is changed, the focus position must also be changed accordingly. The zoom tracking circuitry therefore controls the focus in order to maintain correct focus at any zoom position. The data about the correlation between zoom position and focus position are stored in IC261 (camera microprocessor).

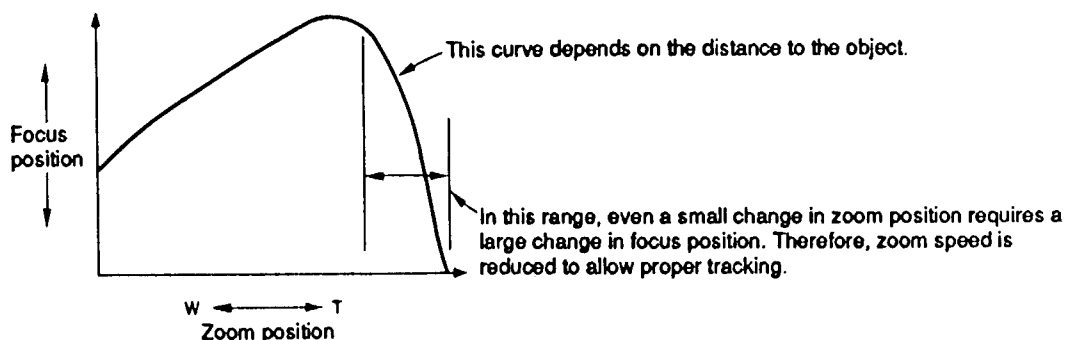
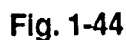
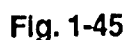


Fig. 1-43



- ### 1-12-2. Zoom Motor Drive Circuit



- 41 -

1-13. Auto White Balance Circuit

1-13-1. Principle of TTL Auto White Balance Pull-In

To understand the principle of TTL auto white balance, assume that the entire screen is integrated and the results are plotted on the coordinates of a vector scope. (The microprocessor simulates a kind of vectorscope which is constantly being checked.)

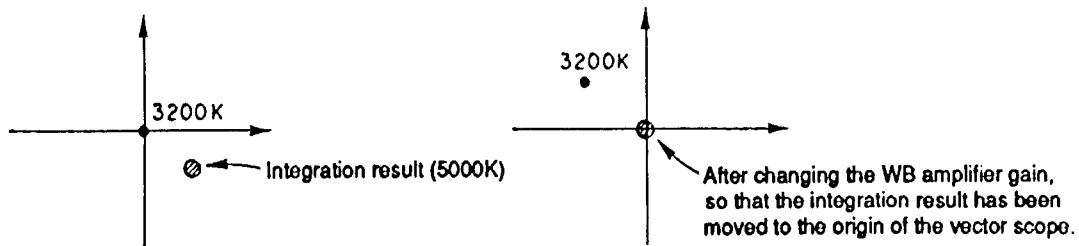


Fig. 1-46

Establishing white balance means controlling the gain of the white balance amplifier so that the integration result is moved to the origin of the vector scope. However, if white balance is actuated without any restrictions, erroneous operation may result with everything turned to white. To prevent this problem, range restriction is applied. This range is represented by an area on the vector plane.

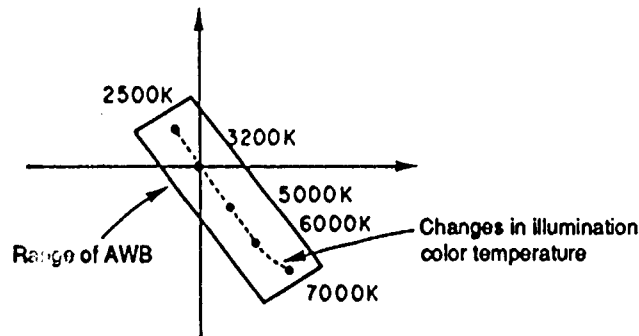


Fig. 1-47

The range to which white balance is restricted is called the auto white balance operation frame in this manual. In actual operation, this frame takes a highly complex shape, which can be changed under EVR control, in order to

- 1) determine the auto white balance response (to prevent erroneous operation), and
- 2) absorb differences in individual CCD devices due to their spectral characteristics.

1-13-2. Differences Between Old and New System

No changes have been made to the measuring section where the internal signals (R, G, B) are subject to A/D conversion.

However, the camera signal processing system is new, and the auto white balance principle has been changed as follows.

1. Change from open-loop control to closed-loop control

In the old camera signal processing system, the signal from the CCD imager was fed to an external output and subject to microprocessor control immediately after R, G, B separation (Fig. 1-49). In the new system, there is no external output before the auto white balance amplifier and the data are fed to the microprocessor only after gain control by the auto white balance amplifier (Fig. 1-50).

- 1) In the old system, the CCD output level could be read directly, regardless of the white balance control output. In the new system, the CCD output level can only be determined by calculating the white balance amplifier gain from the microprocessor input level and the white balance control voltage, and further deducting the level before the white balance amplifier.
- 2) In the old system, differences in white balance amplifier gain, matrix spectrum, etc. could be absorbed by individual adjustment. Such an adjustment cannot be made in the new system. Therefore, when a measurement is made with a different color temperature from the one at which white balance control voltage was made to match the white balance, a larger error than in the old system occurs.
- 3) Because the new system uses a closed-loop approach, white balance is obtained by sequential approximations to the target value, so that the final accuracy is better than in the old system.

2. Changes in White Balance Control Amplifier Voltage

The control voltage vs. gain relationship of the white balance gain control is reversed relative to the power supply and GND for the new system, as shown in the diagram below.

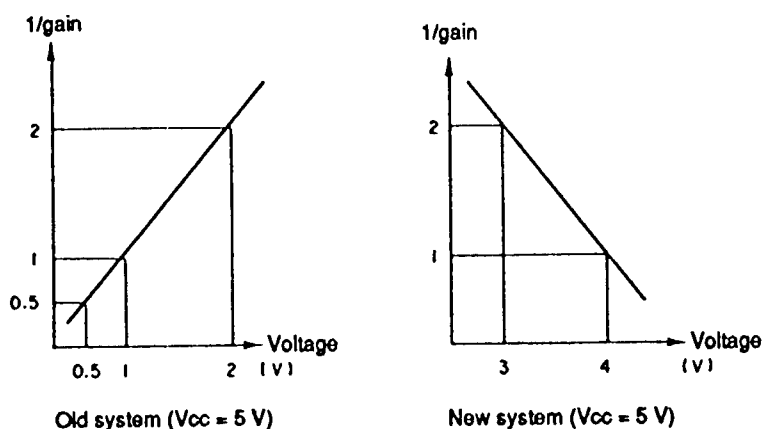


Fig. 1-48

For the old system, the gain increased or decreased in inverse proportion to the voltage relative to 1 V. However, the new system is based on 4 V ($V_{cc} - 1$ V) and the gain is inversely proportional to the difference from V_{cc} .

- For the auto white balance data of the old system to be easily integrated in the new system, the polarities of auto white balance control data are inverted internally in the camera microprocessor to ensure that the apparent control voltage characteristics are the same for both systems. Therefore, unlike outputs to other D/A converters, the output voltage for 00h decreases when V_{dd} and data increase.

[Old camera signal processing section, auto white balance circuit]

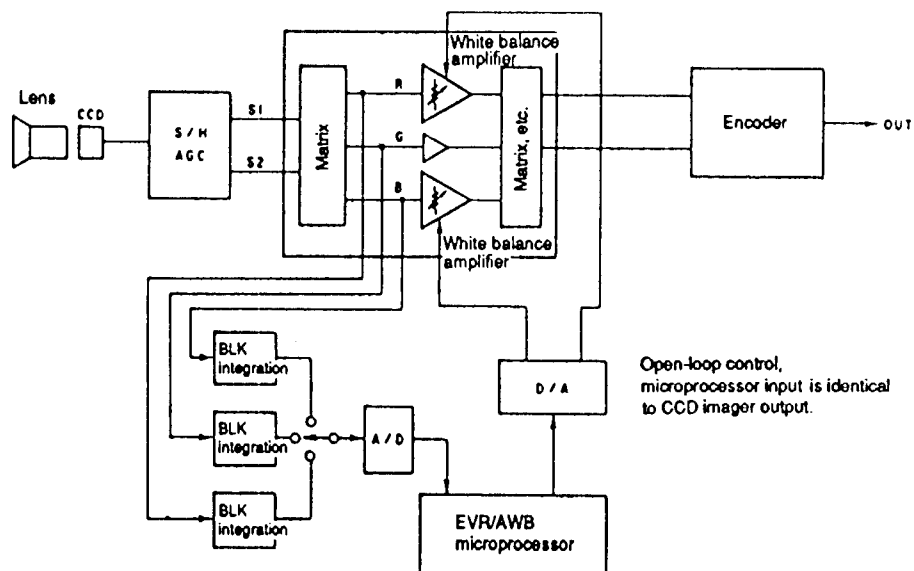


Fig. 1-49

[New camera signal processing section, auto white balance circuit]

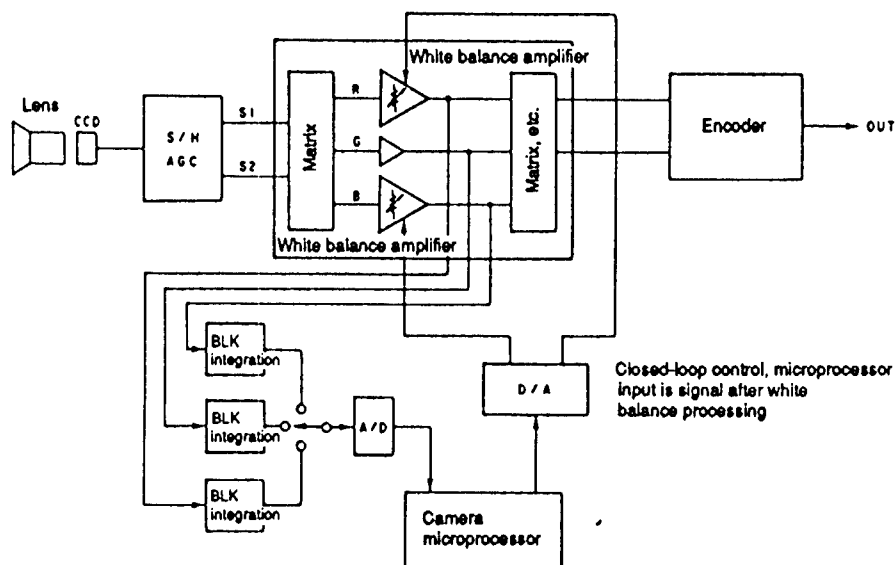


Fig. 1-50

- In the old system, the white balance operation frame was based on the CCD imager output immediately after color separation, because this was the signal read by the microprocessor. With the new system, the data taken into the microprocessor is the value after white balance is controlled, so that the operation frame cannot be set directly by the data as is. Also, because feedback is applied, the integrators must be allowed some time to stabilize after the white balance control output has changed.

3. Inverse calculation of auto white balance data from measured data

In the new system, the auto white balance data is input to the microprocessor after being processed by the white balance amplifier. In a white-balanced state, for example, the data always has a constant value regardless of the color temperature of the object, so that it is impossible to obtain color temperature information. Therefore, the data before input to the white balance amplifier (the same data that was measured for the old system) is inverse calculated from the white balance amplifier gain and measured data for use as the white balance data. The inverse calculation is made as follows.

- 1) The measured data for R, G, B are taken as R_m , G_m , B_m .
- 2) The white balance amplifier gain is inversely proportional to the white balance amplifier control voltage.
 $R_{gain} = 1/R_{cont}$
 $B_{gain} = 1/B_{cont}$
- 3) The data before the white balance amplifier input are taken as R_{org} , G_{org} , B_{org} .
 $R_{org} = R_m/R_{gain}$
 $= R_m * R_{cont}$
 $B_{org} = B_m * B_{cont}$
The input can therefore be calculated as above.
- 4) For green, it is assumed that $G_{gain} = 1$ and $G_m = G_{org}$.

4. Calculation of control voltages (NewR, NewB)

The auto white balance input (R_{org} , G_{org} , B_{org}) obtained in 3. serves to calculate the white balance control voltage (NewR, NewB) which ensures that $R = G = B$.

Because the old system used a complete open-loop control, the control gain had to be precisely adjusted to absorb tolerances in CCD imagers and signal processing ICs (ΔR , ΔB adjustment). Since the new system makes use of feedback, precise gain adjustment is unnecessary and fixed values in ROM are used.

This is done by the following procedure.

- 1) R_{org} , G_{org} , and B_{org} are normalized assuming the value of 3200k = 1.
- 2) R_{org}/G_{org} and B_{org}/G_{org} are calculated.
- 3) Because the white balance amplifier gain is inversely proportional to the control voltage, NewR and NewB are obtained by multiplying the value calculated in 2) by the control voltage for 3200k.

5. Verification of NewR and NewB

Verification is made to check whether the NewR and NewB calculated as described in section 4 are within the auto white balance operation frame. The iris position data and shutter speed obtained from the Hall element are used to discriminate between indoor and outdoor shooting, and the operation frame is switched accordingly.

6. Calculation of control voltage target values (Raim, Baim)

If the above verification result is positive, Raim and Baim are calculated. On the blackbody radiation color temperature curves, the operation frame is narrower when outdoor shooting rather than indoor was determined. Therefore, the target values Raim and Baim for the output are calculated using NewR and NewB determined from the input data.

7. Changes in white balance control voltages (Rcont, Bcont)

The preset values of Rcont and Bcont for 3200k are as follows.

$$Rcont = 5 - 5Ah * (3/255) = 3.941 (V)$$

$$Bcont = 5 - 50h * (3/255) = 4.059 (V)$$

The relationship between the white balance control data and the actual output is as follows.

$$\text{Actual control voltage} = \text{supply voltage} - \text{control data} * (\text{D/A variable range} / 255)$$

1-13-3. Modes

The white balance has five modes: INDOOR (fixed), OUTDOOR (fixed), AUTO, HOLD, and One-push Auto White Balance.

1. INDOOR (fixed)

Fixed data is output as 3200k preset value:

$$Rcont = 5Ah$$

$$Bcont = 50h$$

2. OUTDOOR (fixed)

Fixed values stored in EVR data are output.

$$Rcont = a : 9A \text{ (Address 9A data are output.)}$$

$$Bcont = a : 9B$$

The normal set values correspond to a blackbody radiation color temperature curve around 5600k (adjusted by the filter C14).

3. HOLD

The immediately preceding auto value is held.

4. AUTO

Auto white balance with automatic tracking is carried out.

1-13-4. Output at Power-on

1. Reset start

When there is no backup by lithium battery or battery pack, the AUTO mode is selected white balance control is initiated with the preset EVR values.

$$Rcont = a : 98$$

$$Bcont = a : 99$$

2. Normal start

The data on the most recent mode and auto values are stored by the mode controller, and the camera starts again with these values. If more than 60 minutes have elapsed since the last power-off, white balance is initiated with the AUTO backup data, and an alarm indication is activated.

1-13-5. AUTO Operation

In the AUTO mode, the Hall element data and shutter speed data are used to determine brightness, and differences in the actual and target values are used to control auto white balance. The following describes operation in AUTO mode, beginning from power-on.

1. From power-on to stabilized operation

When the power is turned on, the initial values of Rcont and Bcont are written to the processor. The control voltage then remains fixed until the video mute condition is cleared.

- a) When video mute is cleared and valid AWB data are obtained, the control voltage is calculated from these data (here called "target value"). The current control voltage ("current value") is compared for Bcont. If the difference is more than 5 bits, the target value is output, and hysteresis is turned on. This completes the auto white balance pull-in after mute was cleared.

If the difference is within 5 bits, the current value is not changed, and hysteresis is turned on.

After the above steps, the system enters stable operation.

- b) If valid auto white balance data were not obtained, the high-speed tracking mode is activated. In this mode, high-speed tracking is carried out as soon as valid auto white balance are obtained (the output is changed by 1 bit for each 3 V, to approach the target value). When the target value and current value are identical, the mode is terminated, hysteresis is turned on, and the system enters stable operation.

If REC is activated before the target value and current value match, the high-speed tracking mode is terminated at that point, and the system enters stable operation. The fast motion of auto white balance therefore does not register on the tape.

The INDOOR/OUTDOOR discrimination (Note) is made in the same way as in steady operation.

Note: INDOOR/OUTDOOR discrimination

In the AUTO condition, the brightness is used to distinguish between indoor and outdoor and to change the auto white balance frame and output range accordingly. The data from the Hall element at the iris meter indicate the iris opening condition. In addition, shutter speed data are also used to determine whether the currently filmed object is bright or dark. If it is dark, the INDOOR setting is chosen. If it is bright, the OUTDOOR setting becomes active.

2. Steady operation state

The steady operation mode is entered after power-on, when the initial tracking is completed. The tracking speed during tracking becomes slower, as determined by EVR a:C7. (The a:C7 data are traced at a rate of 1 bit per 3 V.)

1-14. Serial Data Transfer in the Camera Section

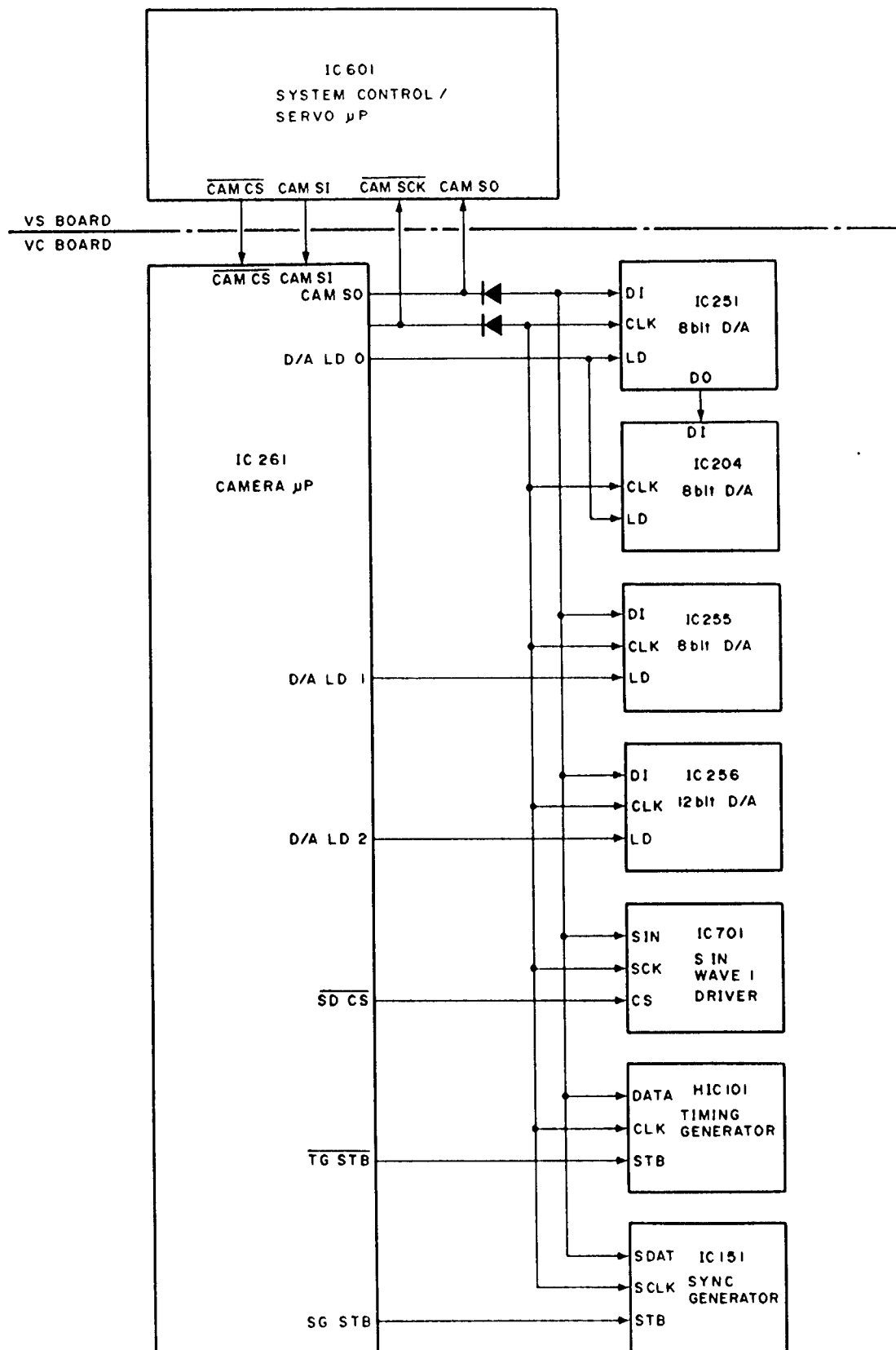


Fig. 1-51

2. DIGITAL TITLER

2-1. Comparator

[Purpose]

Converts the Y signal recorded with the camera into a binary (High and Low) signal.

[Operation]

1. The Y signal from the camera is input to pin 2 of IC253 (title mix IC).
2. The comparator threshold is set by the voltage at pin 3 (TH-CONT), coming from pin 7 of IC255 (EVR).
3. The comparator output appears at pin 1 of IC253. It is Low when the Y signal input at pin 2 is higher than the threshold level, and High when the signal is lower than the threshold level.

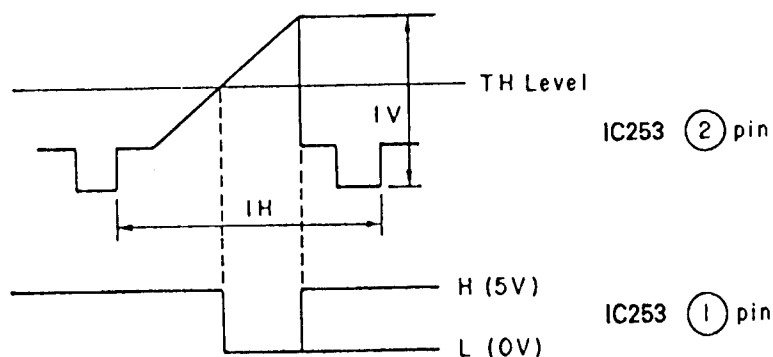


Fig. 2-1

2-2. Title Controller

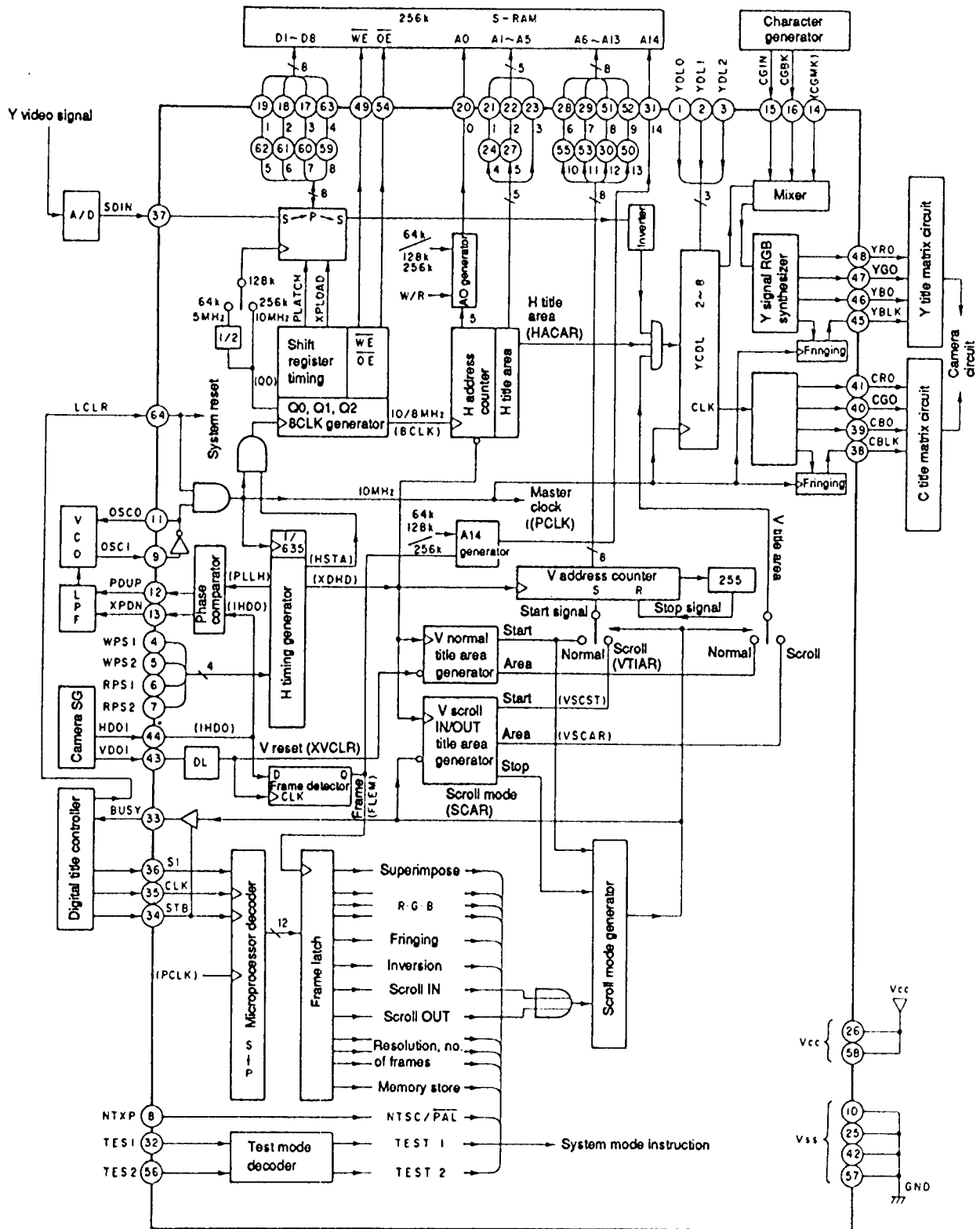


Fig. 2-2 Internal block diagram

2-2-1. Shift Register (Fig. 2-2)

[Purpose]

Produces 8-bit parallel data from the A/D converted Y signal by sampling it approximately every 100 nanoseconds, for storage in static RAM (SRAM).

[Operation]

1. The A/D converted Y signal is input to the shift register in IC803 from pin 37 of IC803.
2. The Y signal sampling for the shift register is carried out at the rising edge of the 9.5 MHz clock (pin 9 of IC803).
3. When sampling for 8 bits is completed, the PLATCH signal goes high and the 8-bit data are latched and output via the D1-D8 terminals. The 8-bit parallel data are stored until the next rise of the PLATCH signal.
(The Y signal sampling for the shift register is carried out continuously.)

2-2-2. Writing Title Data to SRAM (IC801) (Fig. 2-2)

[Purpose]

Write the data sequentially in 8 bits to the specified addresses in SRAM (IC801). The data written to memory do not contain the horizontal and vertical blanking sections of each field, to save memory space.

[Operation]

1. The write addresses are generated by the H address counter and V address counter in IC803. The address consists of the H address (A0 - A5) and V address (A6 - A13). The V address indicates the scanning line number for the write data (0 - 255). Therefore, this address is incremented every 1H (63.56 μ s for NTSC, 64.00 μ s for PAL). The H address indicates the position on the scanning line (0 - 63), which is incremented every 8 clock cycles (800 ns).
2. 1 clock cycle after the H address (pins 20 - 24, pin 27) has changed, the $\overline{WE}$ signal (pin 49) goes Low.
3. 1.5 clock cycles after the H address has changed, the PLATCH signal goes High, and the sampled 8-bit parallel data appear at the D1-D8 terminals.
4. 3 clock cycles after the H address has changed, the $\overline{WE}$ signal goes High and the 8-bit parallel data at the specified address are written to memory (IC302).
5. 3.5 clock cycles after the H address has changed, the PLATCH signal goes Low.
6. 8 clock cycles after the H address has changed, a new H address is output.
Steps 2 - 6 are then repeated.

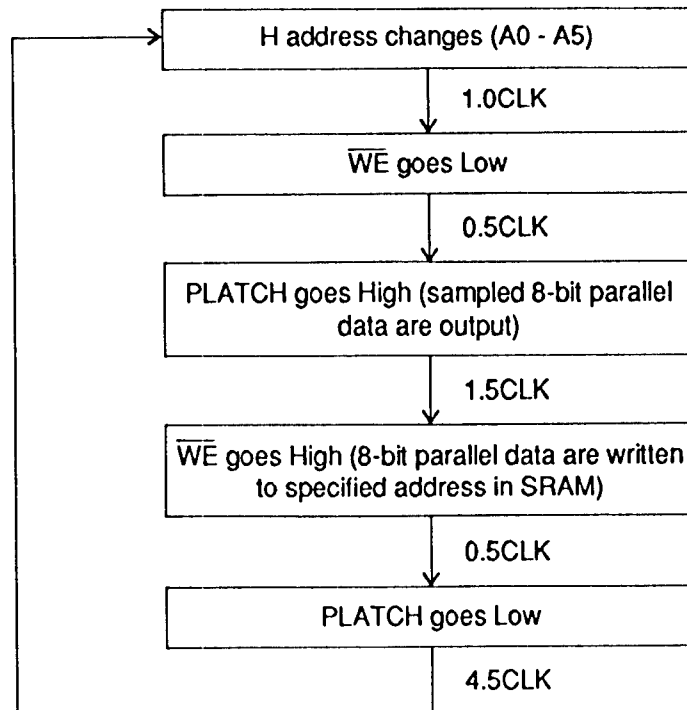


Fig. 2-4 Title data memory write sequence

2-2-3. Reading Title Data from SRAM (IC801) (Fig. 2-3)

[Purpose]

Read title data in 8-bit blocks from specified address in SRAM (IC801). Convert read data into serial form using a shift register.

[Operation]

1. The $\overline{OE}$ signal (pin 54) is Low when reading title data from memory (i.e. when superimposing a title).
2. The read addresses are generated by the H address and V address counters in IC803, in the same way as for memory writes.
3. When the H address (pins 20-24, pin 27) changes to specify a new address, the memory IC801 immediately outputs the corresponding data. (However, it takes 100 - 150 ns until the new data are valid.)
4. 2 clock cycles after the H address has changed, the XPLOAD signal goes Low and the 8-bit parallel data (D1 - D8) output from memory are read by the shift register. (The XPLOAD signal returns to High after 0.5 clock cycles.)
5. The 8-bit data read into the shift register are sequentially shifted out bit by bit to the next stage, in sync with the rising edge of the 10 MHz clock (pin 9). In this way, the parallel data are converted into serial data.

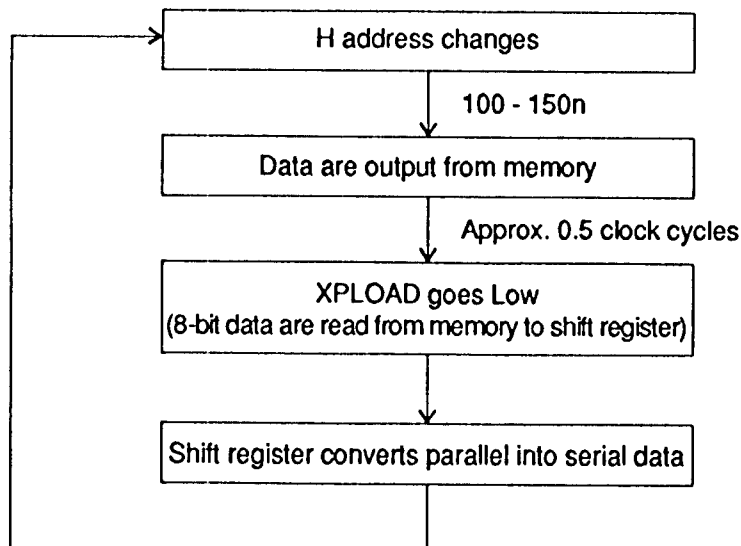


Fig. 2-5 Title data memory read sequence

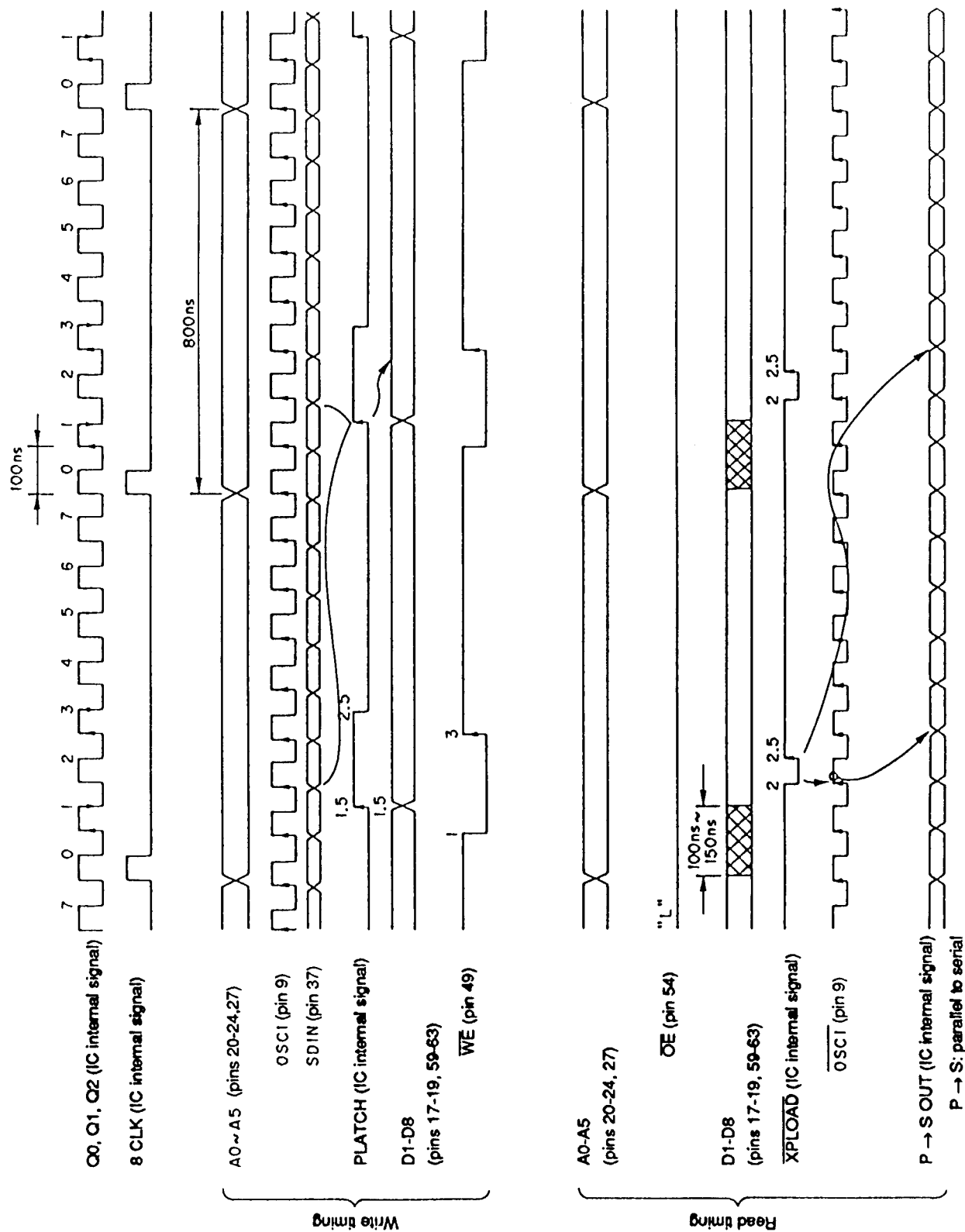


Fig. 2-6 Memory read/write timing chart

2-2-4. AND Gate (Fig. 2.2)

[Purpose]

Disables output of title signal (shift register output signal) in sections other than the title area on the screen, to prevent the camera output Y signal sync and the camera output chroma signal burst from being corrupted.

[Operation]

1. The shift register output signal passes the AND gate before being output to the delay circuit.
2. The gate signals of the AND gate are the H title area signal and the V title area signal. The shift register output is passed on to the next stage only when both gate signals are High.
[The H title area signal is High during the effective horizontal title period (the period except the horizontal blanking interval). The V title area signal is High during the effective vertical title period (the period except the vertical blanking interval).]

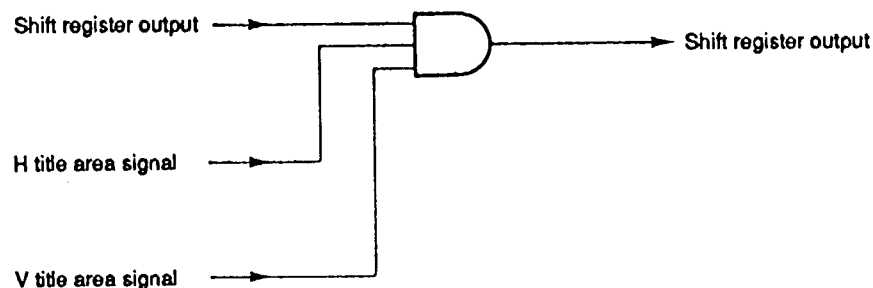


Fig. 2-7 AND gate

2-2-5. Y/C Delay Circuit (Fig. 2-2)

[Purpose]

In the subsequent analog circuits (mixer etc.), the chroma signal trails the Y signal, because the frequency bandwidth of the chroma signal is narrower than that of the Y signal. This can lead to a rightward shift in the title color. To prevent this, the title Y signal must be delayed relative to the title chroma signal.

[Operation]

1. The output signal of the shift register is delayed by 8 clock cycles (800 ns), to produce the title Y signal. The title chroma signal is a signal which was delayed by 3 clock cycles. Therefore the title Y signal must be delayed by 5 clock cycles (500 ns) relative to the title chroma signal.

[The delay in the title Y signal relative to the title chroma signal can be adjusted in the range of 2 to 8 clock cycles by setting the levels of IC803, pins 1 to 3.]

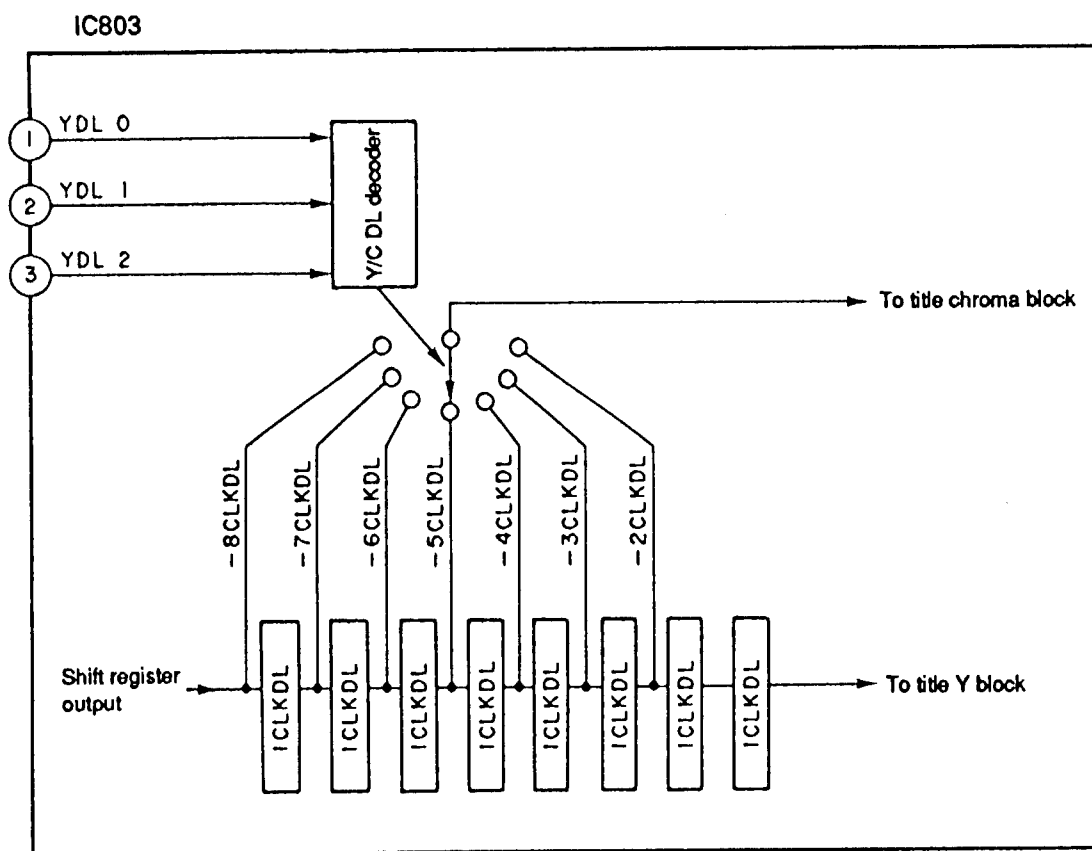


Fig. 2-8 Y/C delay circuit

2-2-6. Title Synthesizing Circuit

The title synthesizing circuit consists of a title chroma signal synthesizer section and a title Y signal synthesizer section.

[Title chroma signal synthesizer]

The title chroma signal consists of the CR OUT, CG OUT, and CB OUT signals and the C BLK signal. The C BLK signal is produced directly from the shift register output signal. The CR OUT, CG OUT, and CB OUT signals are obtained by using the shift register output and the serial R, G, B data signal from IC601 (VS board, servo/system control microprocessor) in an AND configuration. The relation between these signals and the title color is shown in the table below.

Table 2-1

	Title color	White (WHT)	Blue (BLUE)	Green (GRN)	Cyan (CYAN)	Red (RED)	Violet (VIO)	Yellow (YEL)	Black (BLK)
Serial data	R	H	L	L	L	H	H	H	L
	G	H	L	H	H	L	L	H	L
	B	H	H	L	H	L	H	L	L
IC803 output	CR OUT	L	L	L	L	TITLE	TITLE	TITLE	L
	CG OUT	L	L	TITLE	TITLE	L	L	TILTE	L
	CB OUT	L	TITLE	L	TITLE	L	TITLE	L	L

* "TITLE" indicates that the shift register signal is output.

[Title Y signal synthesizer]

Since it is necessary to change the luminance of a title depending on the color, the title Y signal, similar to the title chroma signal, also consists of the three YR OUT, YG OUT, and YB OUT signals and the Y BLK signal. The Y signal is synthesized in basically the same way as the title chroma signal, except for the fact that the shift register signal is output when "white" is specified as the title color.

Note that the DDS character signal from IC802 (character generator) is input to pins 14 - 16 of IC803.

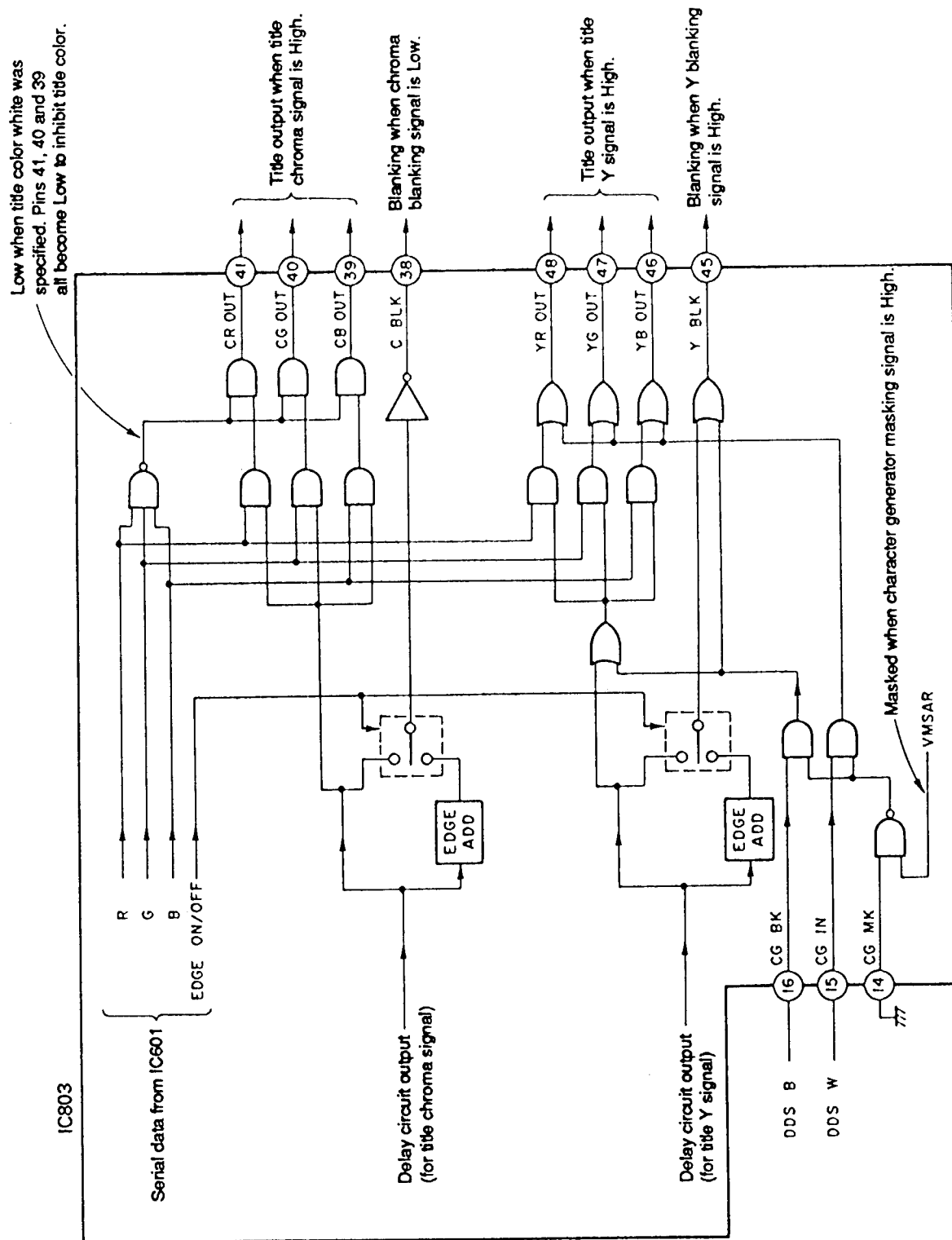


Fig. 2-9 Title synthesizing circuit

2-2-7. S/S Oscillator

[Purpose]

Generates the master clock synchronized to the horizontal sync signal (HD) of the Y signal.

[Operation]

1. The input of the title controller (IC803, pin 44) is the HD signal that is produced from the Y signal (CAM Y in CAM mode or PB Y in playback mode) by sync separation and applying PLL AFC.
2. The master clock of the title controller starts and stops oscillation in sync with the HD input. This is called S/S (start/stop) oscillation.

Reasons for use of a S/S oscillator: The PLL oscillator that was used for example in the models F500 and V89 has better temperature stability, but when titles are used during playback, the jitter components in the PB signal weaken the PLL "pull-in" which leads to title distortion in the H direction. The S/S oscillator has stronger pull-in characteristics.

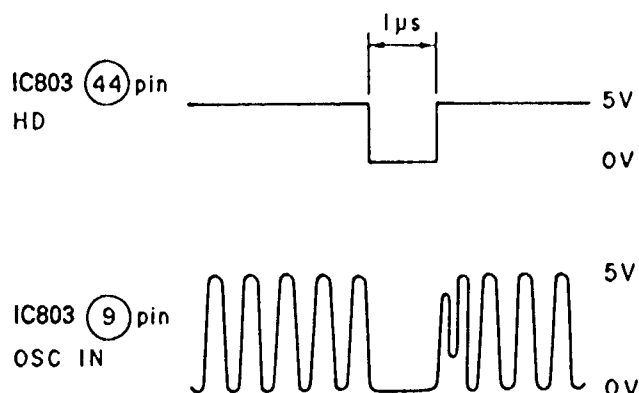


Fig. 2-10

2-2-8. H Address Generation (During Write)

(Horizontal Memory Timing, Fig. 2-12)

[Operation]

1. When the HD signal at pin 44 of IC803 goes High, the H timing generator starts oscillation of the master clock (9.5 MHz). After 62 - 124 clock counts (66 - 128 for the PAL model), the HSTA signal goes high.
 - * The clock count can be adjusted in units of 2, under control of the input level at pins 4 and 5 and three bits in the serial data. This allows fine tuning of the horizontal title position.
2. The HSTA signal is fed to an AND gate. The other input of the gate is the master clock. When the HSTA signal is High, the master clock passes the AND gate and is supplied to the 8CLK generator circuit consisting of Q0, Q1, and Q2.
3. The Q0 clock (9.5 MHz) is input to a shift register and used for sampling of the A-DY signal input from pin 37. The 8CLK signal is produced by decoding the Q0, Q1 and Q2 clocks. This signal is a pulse which becomes High for 1/2 clock cycle after 8-bit sampling is completed. The $\overline{WE}$ signal is also produced by decoding the Q0, Q1 and Q2 clocks. One clock cycle after 8-bit sampling is completed (the 8CLK signal goes High), the $\overline{WE}$ signal becomes Low for 2 clock cycles.
4. The 8CLK signal is input to the H address counter. The counter increments the H address on every rising edge of this input signal.

The H addresses are 0 to 63. The first pulse of the 8CLK signal is not used in this camera, since it is reserved for the 64kbit 4-screen mode.
5. When the $\overline{WE}$ signal goes High, the sampled 8-bit data are read into the memory.
6. When the H address reaches 63 and the write of 8-bit data to memory is completed, output of the $\overline{WE}$ signal is inhibited and the H address is reset to 0. The HSTA signal returns to Low at the next rising edge of the HD signal.

The above procedure completes a write to memory of the data for one scanning line. Note that the V address is incremented at the rising edge of the $\overline{WE}$ signal (more specifically, the XDHD signal).

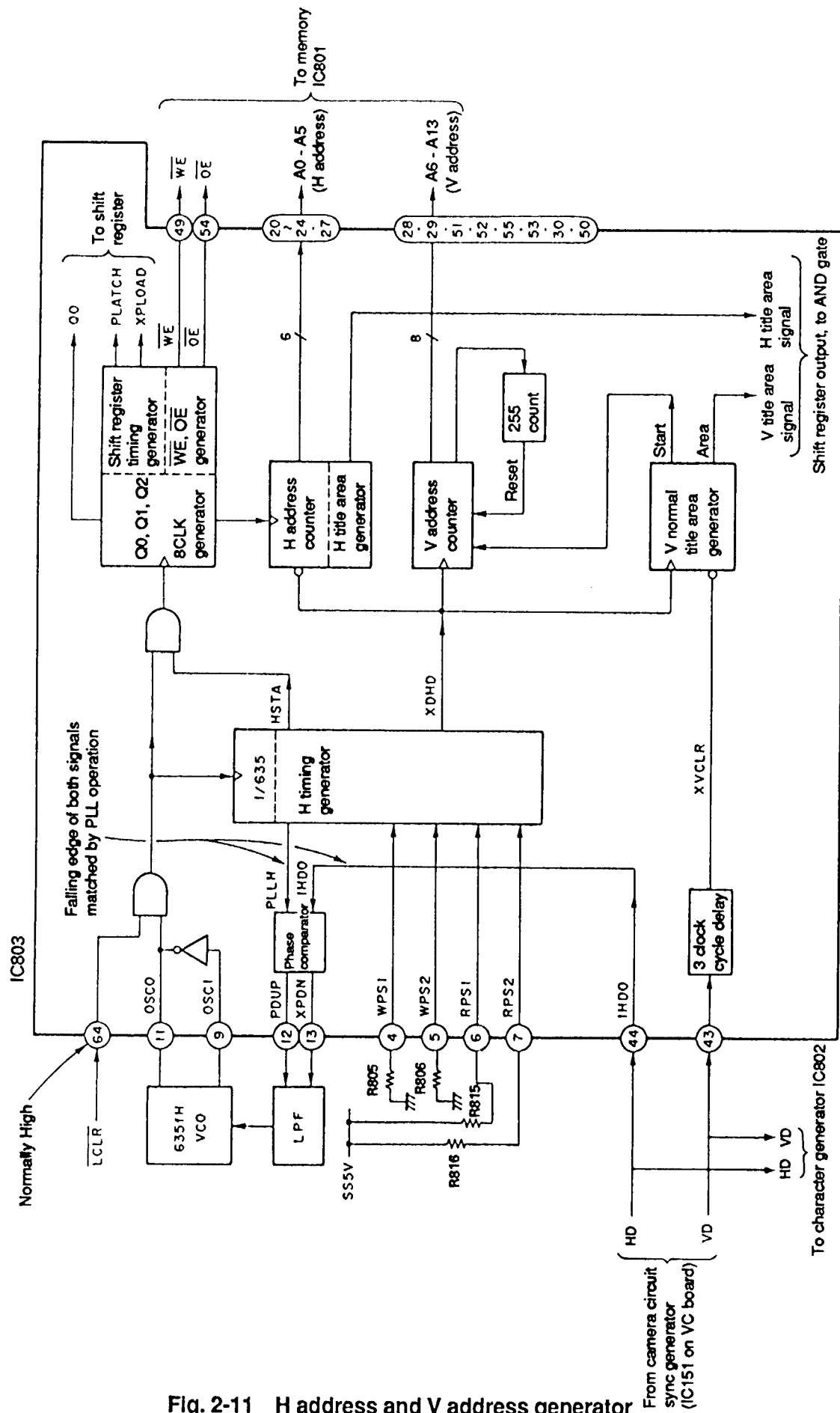


Fig. 2-11 H address and V address generator

2-2-9. H Address Generation (During Read)

(Horizontal Memory Timing, Fig. 2-12)

[Operation]

1. When the HD signal at pin 44 of IC803 goes High, the H timing generator starts oscillation of the master clock (9.5 MHz). After 62 - 124 clock counts (66 - 128 for the PAL model), the HSTA signal goes high.
 - * The clock count can be adjusted in units of 2, under control of the input level at pins 4 and 5 and the serial data. This allows fine tuning of the horizontal title position.
2. When the HSTA signal is High, the master clock passes the AND gate and is supplied to the 8CLK generator circuit consisting of Q0, Q1, and Q2.
3. 9 clock cycles after the HSTA signal goes High, the XPLOAD signal becomes Low for 0.5 clock cycles. The 8-bit parallel data in memory (at H address "0") are input to the shift register.

The XPLOAD signal is produced by decoding the Q0, Q1 and Q2 signals. Every 8 clock cycles, the signal goes Low for 0.5 clock cycles, causing input of memory data in the shift register.
4. The 8-bit parallel data input to the shift register are output sequentially according to the Q0 clock (9.5 MHz). The parallel data are thereby converted into serial data.
5. 15 clock cycles after the HSTA signal went High, the 8CLK signal goes High for 0.5 clock cycles. At this point, the H address is incremented by one count, so that the H address is now "1".

Every 8 clock cycles, the signal goes High for 0.5 clock cycles, causing the H address to be incremented.
6. When the H address reaches 63 and the parallel-to- serial conversion is completed, the H address is reset to 0 and the XPLOAD signal output is inhibited. The HSTA signal returns to Low at the next falling edge of the HD signal.

The above procedure completes the reading of the data for one scanning line. Note that the V address is incremented at the rising edge of the HD signal (more specifically, the XDHD signal).

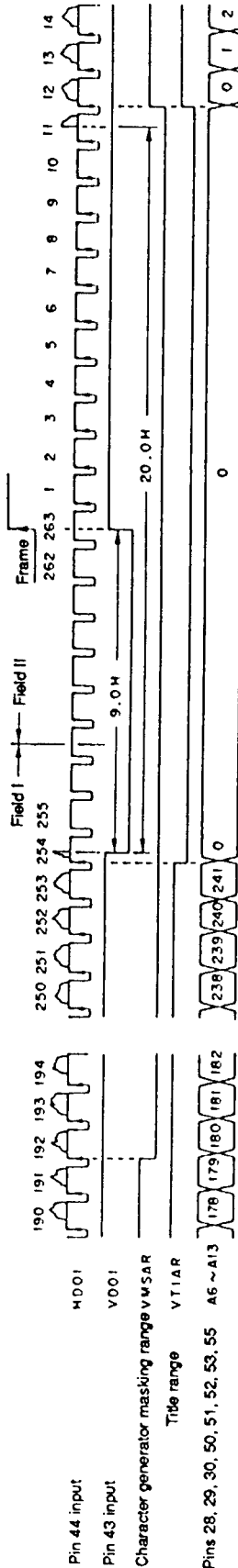
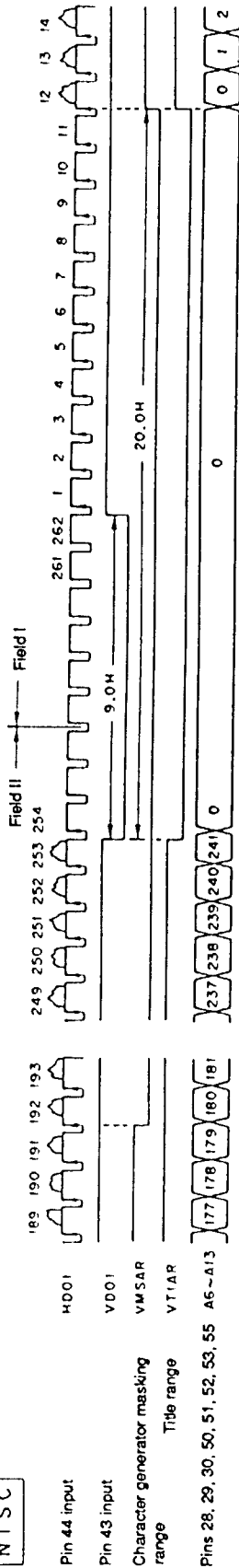
2-2-10. V Address Generation (Fig. 2-2)

(Vertical Memory Timing, Fig. 2-13)

[Operation]

1. The VD signal is input from pin 43 of IC803 to the V normal title generating circuit. This circuit generates a V address counter start signal and V title area signal.
2. The V address counter start signal is generated at the falling edge of the VD signal. This signal resets the V address counter to 0 and starts the count of the HD signal (input as XDHD signal). The V title area signal goes Low for an interval of 20H or 20.5H after the falling edge of the VD signal (in the PAL model, the interval is 42H or 41.5H and the V address must have exceeded "255"). During this interval, the memory read signal (title signal) output is inhibited.
3. The V address counter is incremented by one count at the rising edge of the HD signal.
4. When the V address reaches "255", a stop signal is generated and the address is reset to "0". However, this applies only to the PAL model. In the NTSC model, the V address is reset to "0" already before reaching "255" by a Low on the VD signal.

NTSC



PAL

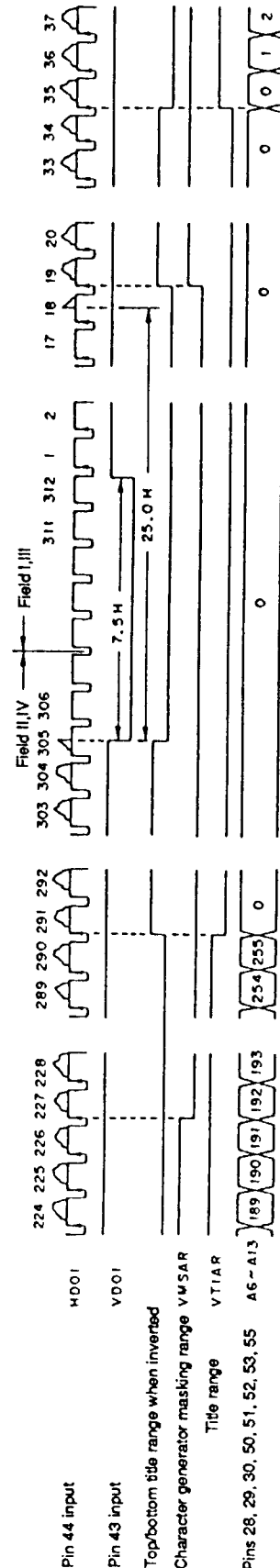
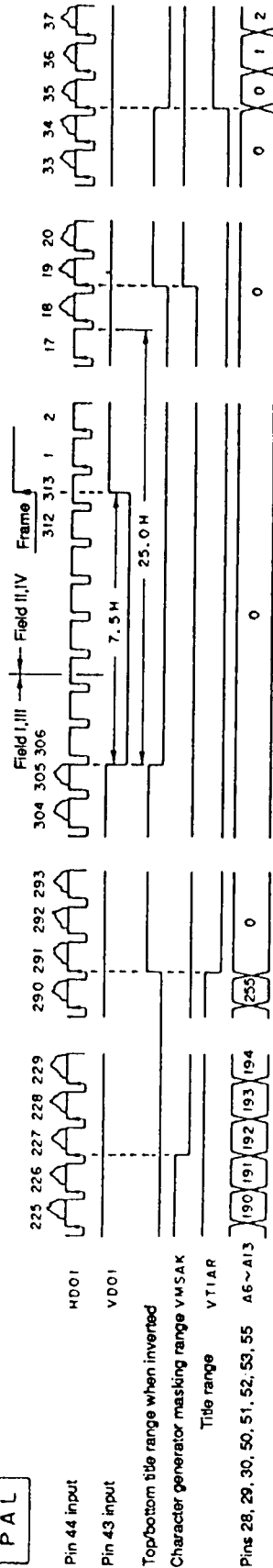


Fig. 2-13 Vertical memory timing

2-2-11. Frame Detection Circuit (Fig. 2-3)

[Purpose]

The HD and VD signals obtained by sync separation are used to detect the frames of the camera output signals (Y and chroma signals) and generate the FLEM signal. This signal serves to synchronize instructions from the DDS microprocessor (serial data for title store, title superimpose, title color switching, etc.).

[Operation]

1. The frame detection circuit consists of a 3 clock cycle delay (300 ns) and a flip-flop circuit. The HD signal input from pin 44 is fed to the D terminal of the flip-flop circuit, and the VD signal from pin 43 is first delayed by 3 clock cycles and then fed to the CLK terminal.
2. The HD signal level is sampled at the rising edge of the VD signal. The result becomes the flip-flop Q output, i.e. the FLEM signal. This field is therefore Low for odd fields and High for even fields.

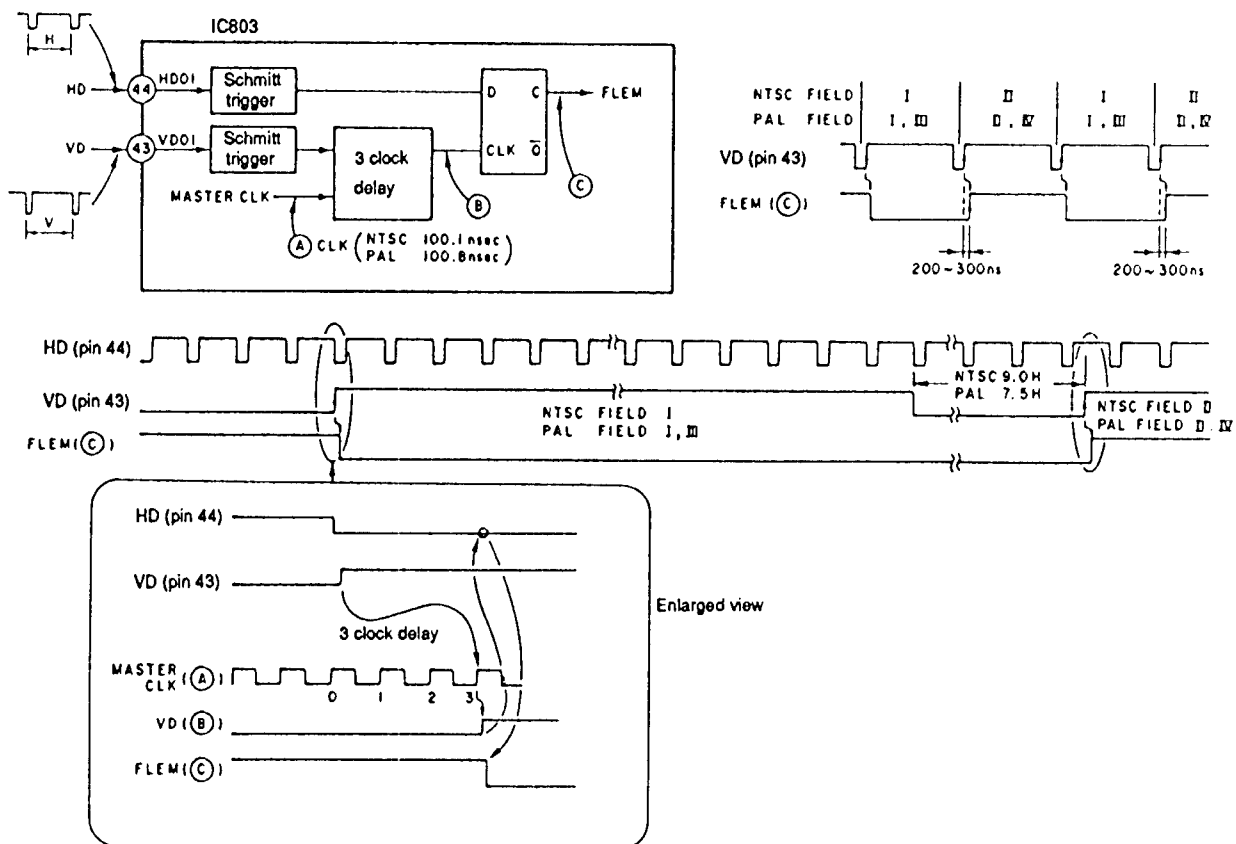


Fig. 2-14 Frame detection circuit and timing chart

2-2-12. Effective Screen Vs. Picture Area

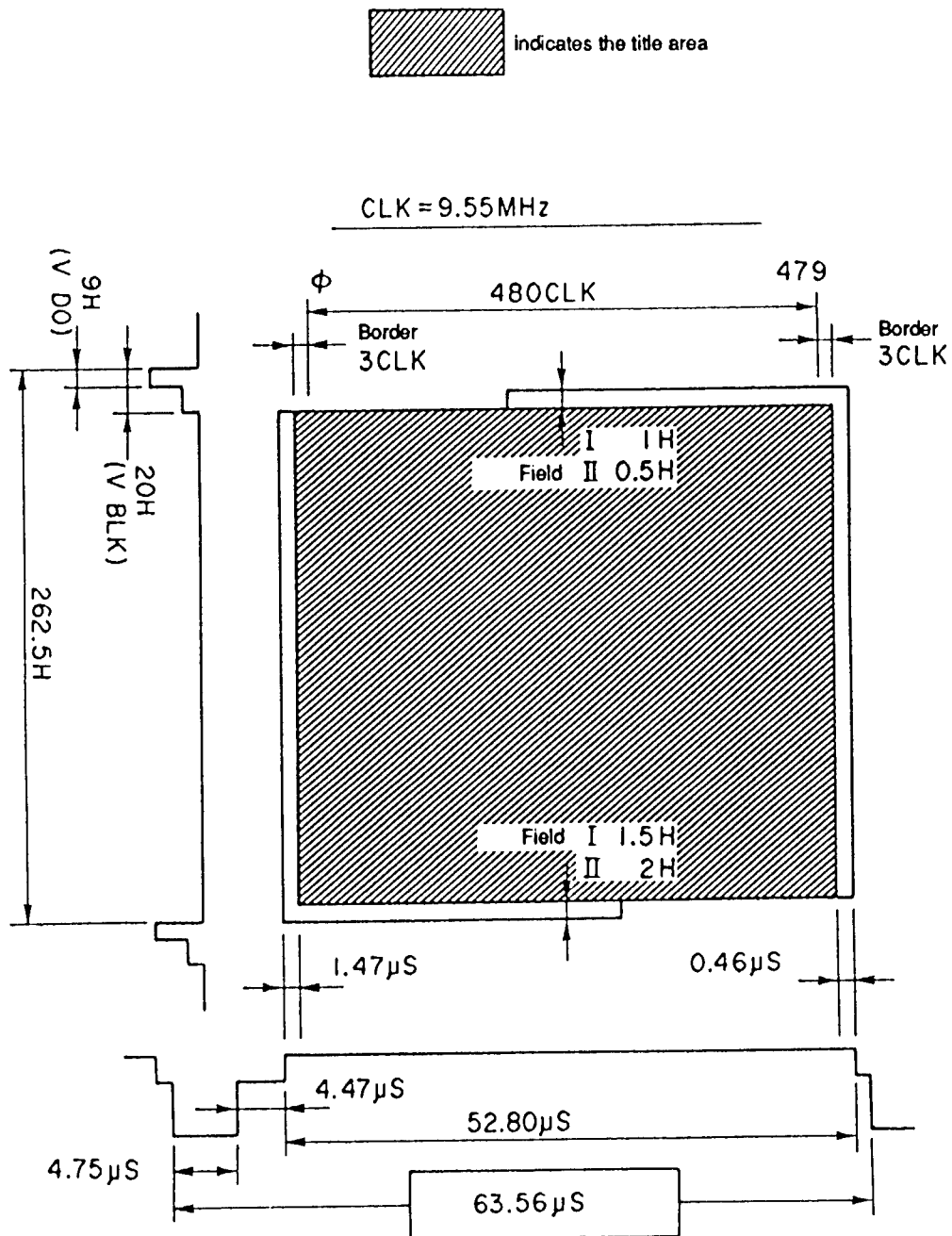


Fig. 2-15

2-3. Title Matrix

The title signal is mixed to the R-Y and B-Y signals coming from the matrix circuit for camera signal processing (IC203 on the VC board).

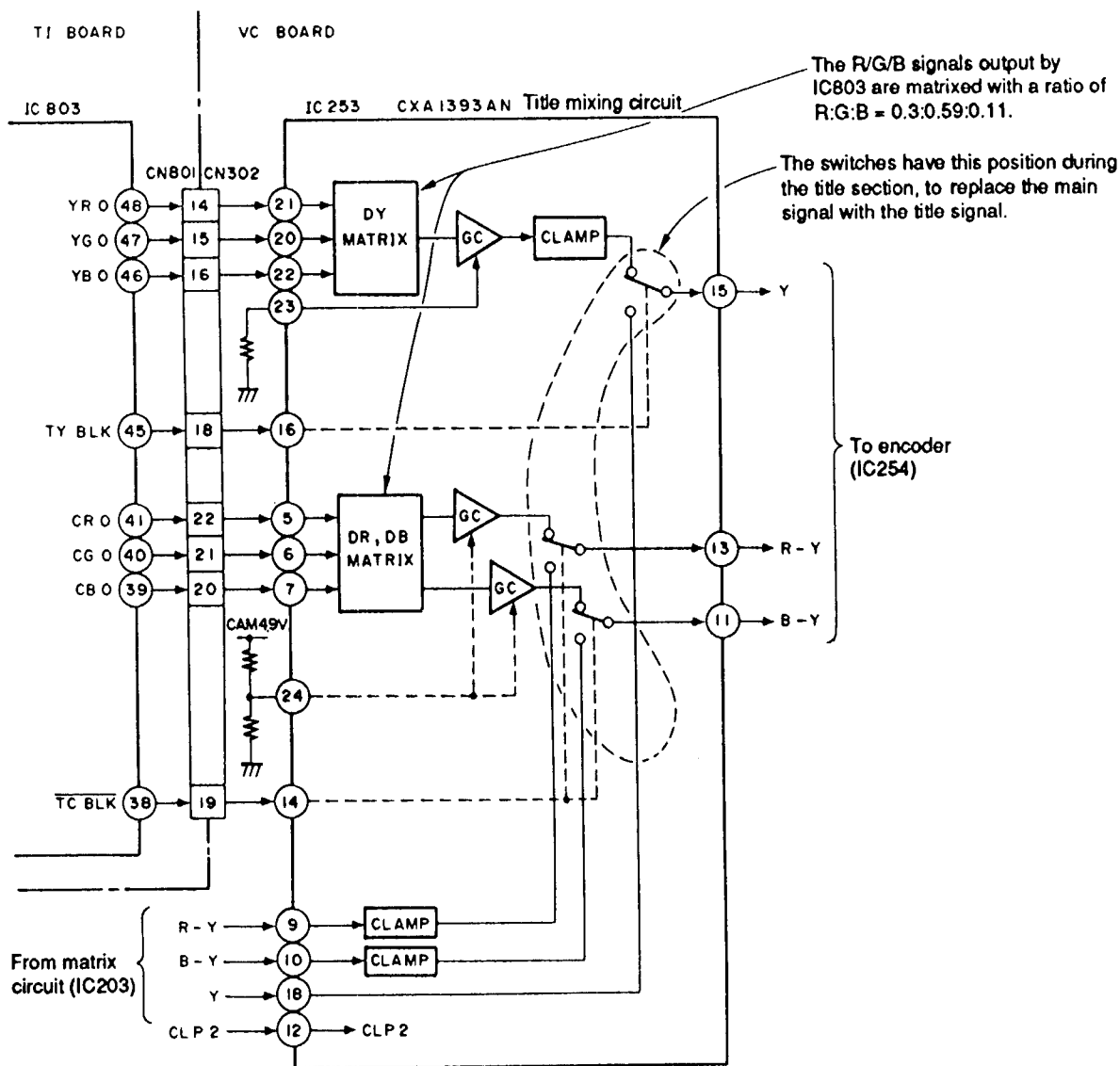


Fig. 2-16

3. VIDEO CIRCUITS

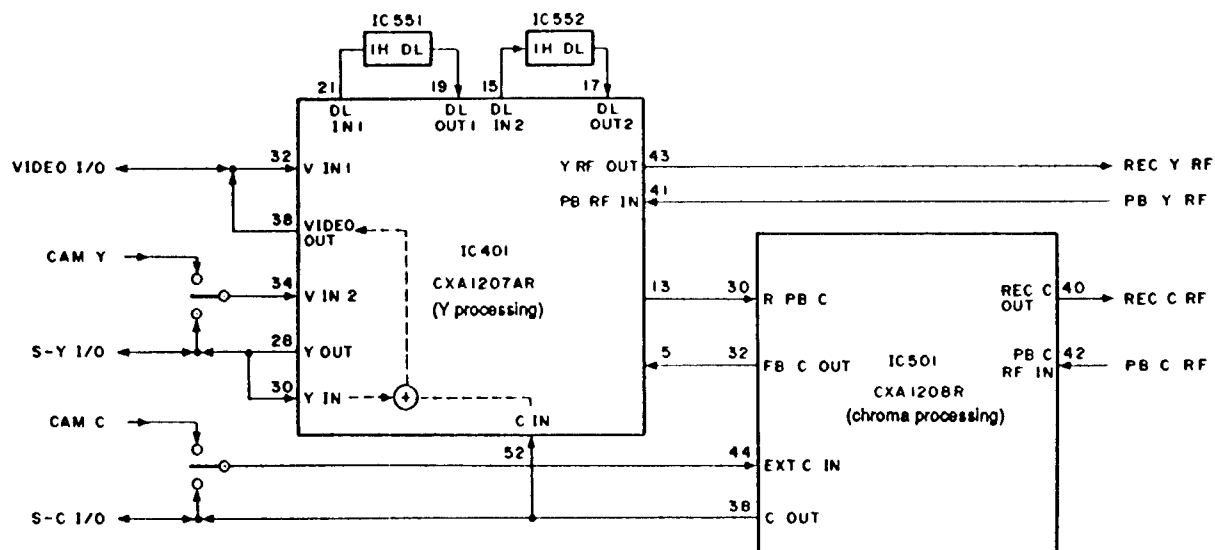


Fig. 3-1

As in the model CCD-V700, the video circuits of this unit are configured around the CXA1207 and CXA1208 chips. A special feature of the system is the fact that the two 1H CCD delay lines (IC551, IC552) connected to IC401 (CXA1207AR) function differently, depending on the operation mode. This saves the need for one more 1H CCD delay line.

Table 3-1 Function of IC551 and IC552 in each mode

Mode	IC551	IC552
Camera REC	C comb filter	—
S INPUT REC	—	—
Video INPUT REC	Y/C separation	Y relative detection
PB	C comb filter	Y comb filter

3-1. Y signal Recording System

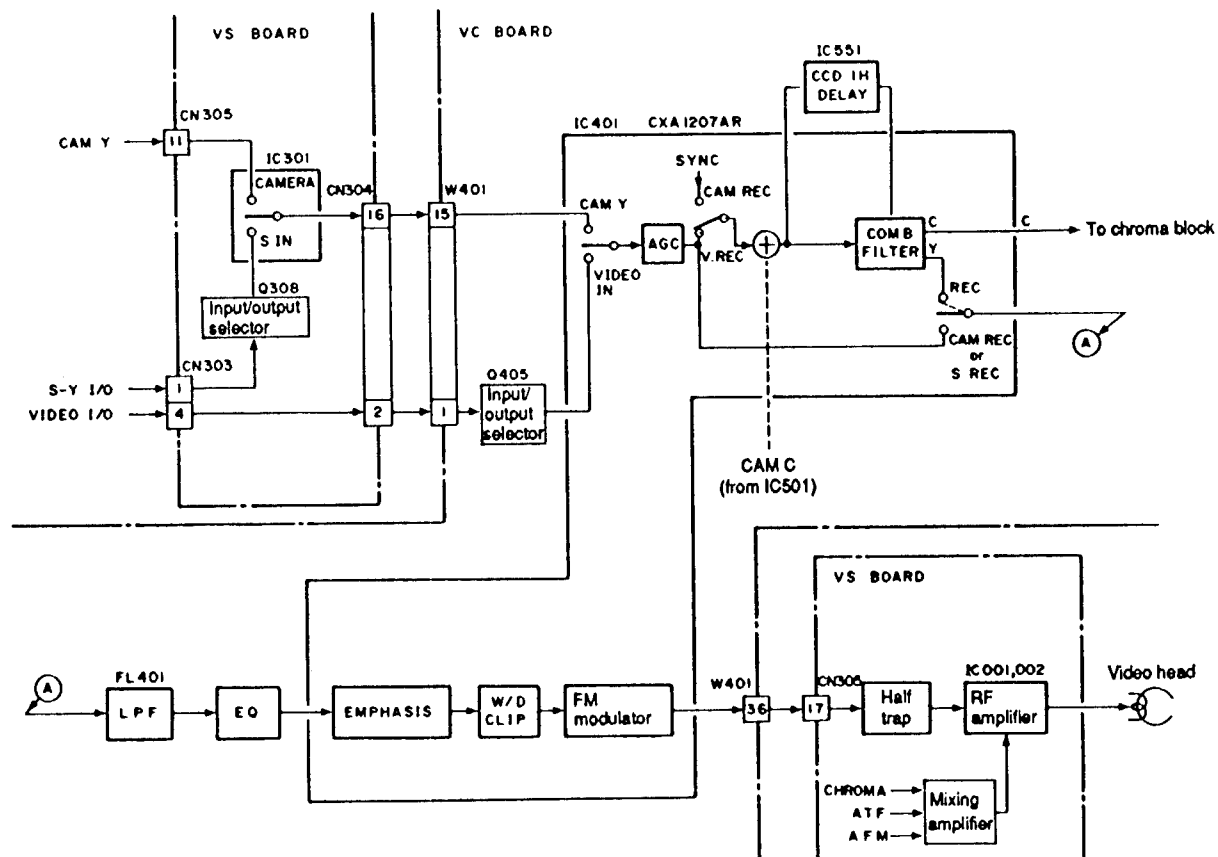


Fig. 3-2

3-1-1. Y Signal Path From S Input During Recording

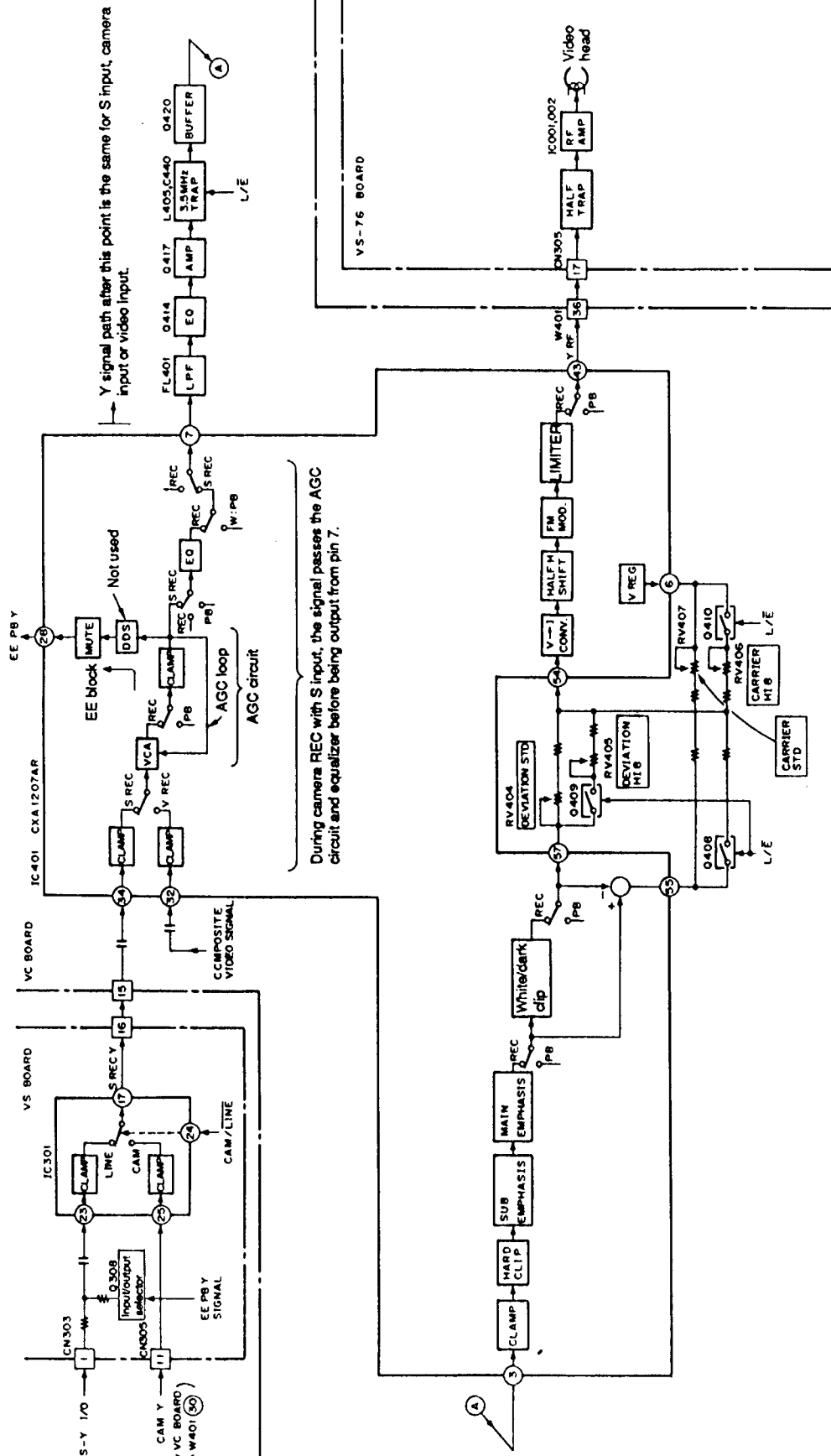


Fig. 3-3

3-1-2. From Pin 7 to Pin 3 (IC401)

* After this point, the Y signal path during recording is the same for S input, camera input or video input.

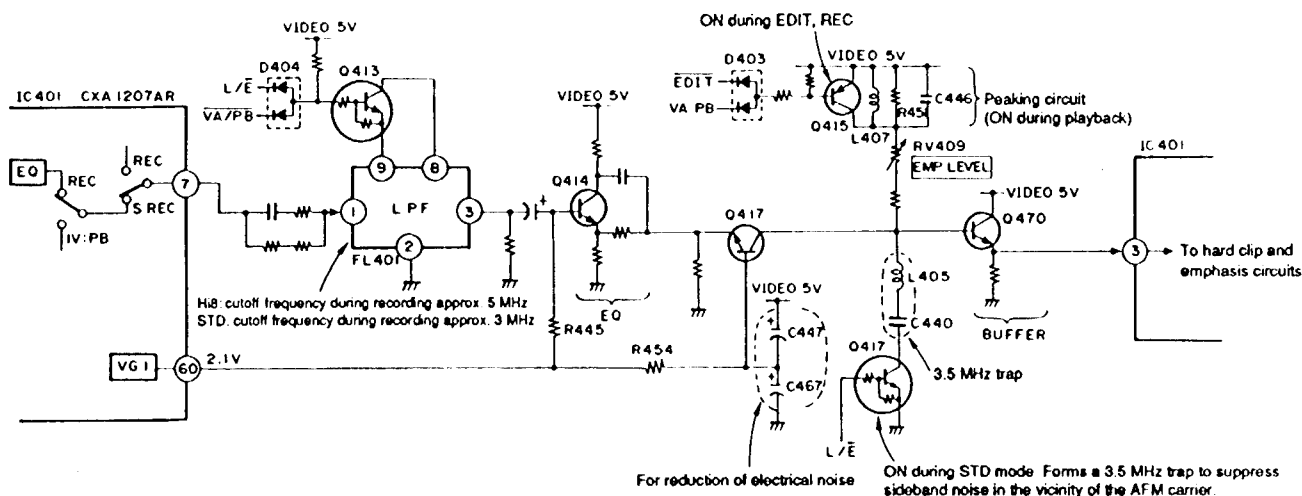


Fig. 3-4

1. FL401 — noise filter

Serves for bandwidth limiting of the REC Y signal and for time matching with the chroma signal.

Q413 switches the cutoff frequency during recording. In the STD mode ($L/\bar{E}$ and $\overline{VA/PB}$ both High), the cutoff frequency is approx. 3 MHz. During playback and Hi8 recording, the cutoff frequency is approx. 5 MHz.

2. Q414, Q417 — Equalizer and base-connected amplifier

Q414 compensates for the insufficient delay of FL401. Q417 is a base-connected amplifier. RV409 connected to the collector forms an emphasis circuit which adjusts the level of the input signal. During recording, Q415 goes ON and the peaking circuit does not operate. Q414 and Q417 are biased by the VG1 signal (2.1 V) from pin 60 of IC401.

3. L405, C440, Q412 — 3.5 MHz trap

L405 and C440 form a 3.5 MHz trap. Q412 is ON in the STD mode, to enable the trap. This suppresses sideband noise in the vicinity of the AFM carrier and reduces interference with AFM audio.

3-1-3. Hard Clip Circuit and Emphasis Circuit

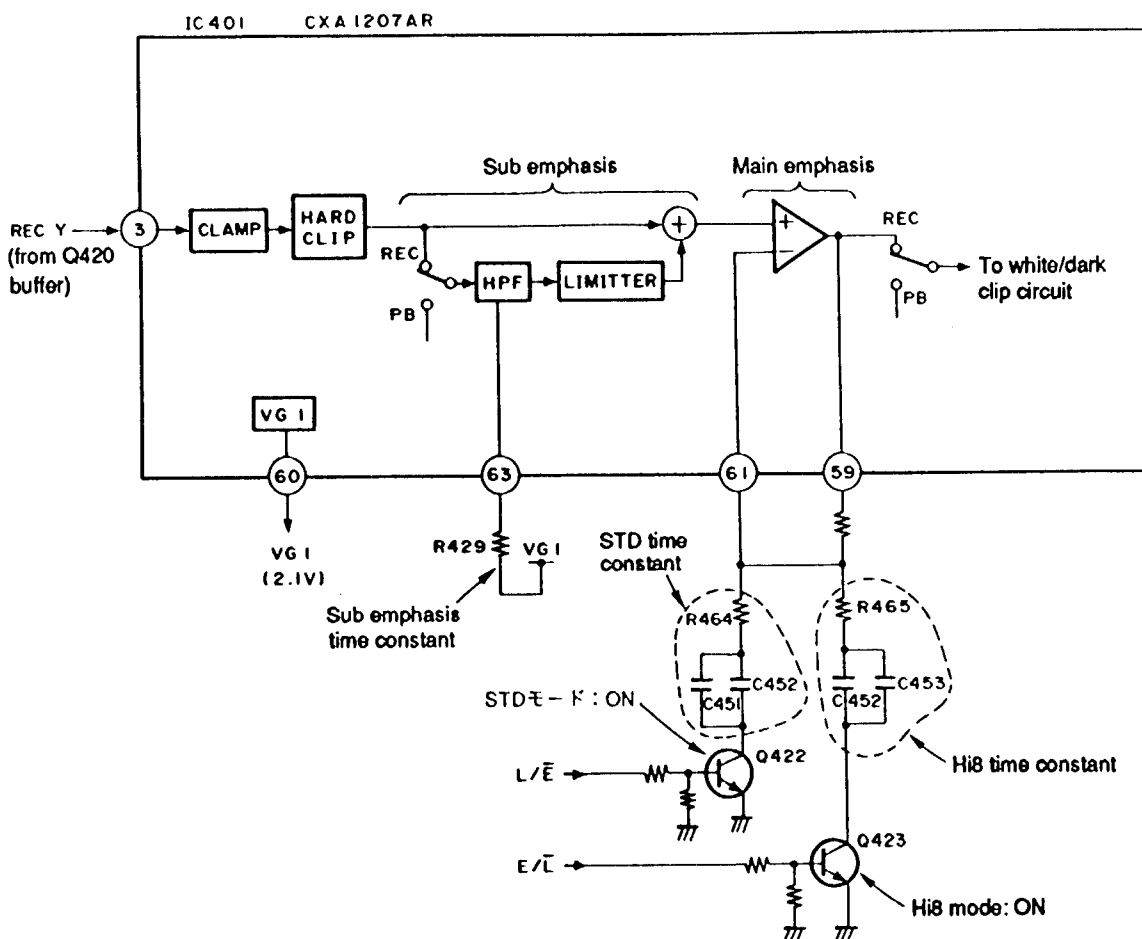


Fig. 3-5

1. Hard clip circuit

Clips Y levels above 120%, to prevent overmodulation.

2. Sub emphasis and main emphasis circuits

The time constant of the sub emphasis circuit is determined by the circuit connected to pin 63. The time constant of the main emphasis circuit is determined by the circuit connected to pins 59 and 61, which are switched according to Hi8 and STD operation modes.

3-1-4. White/Dark Clip Circuits, Smear Compensation Circuit, FM Modulator

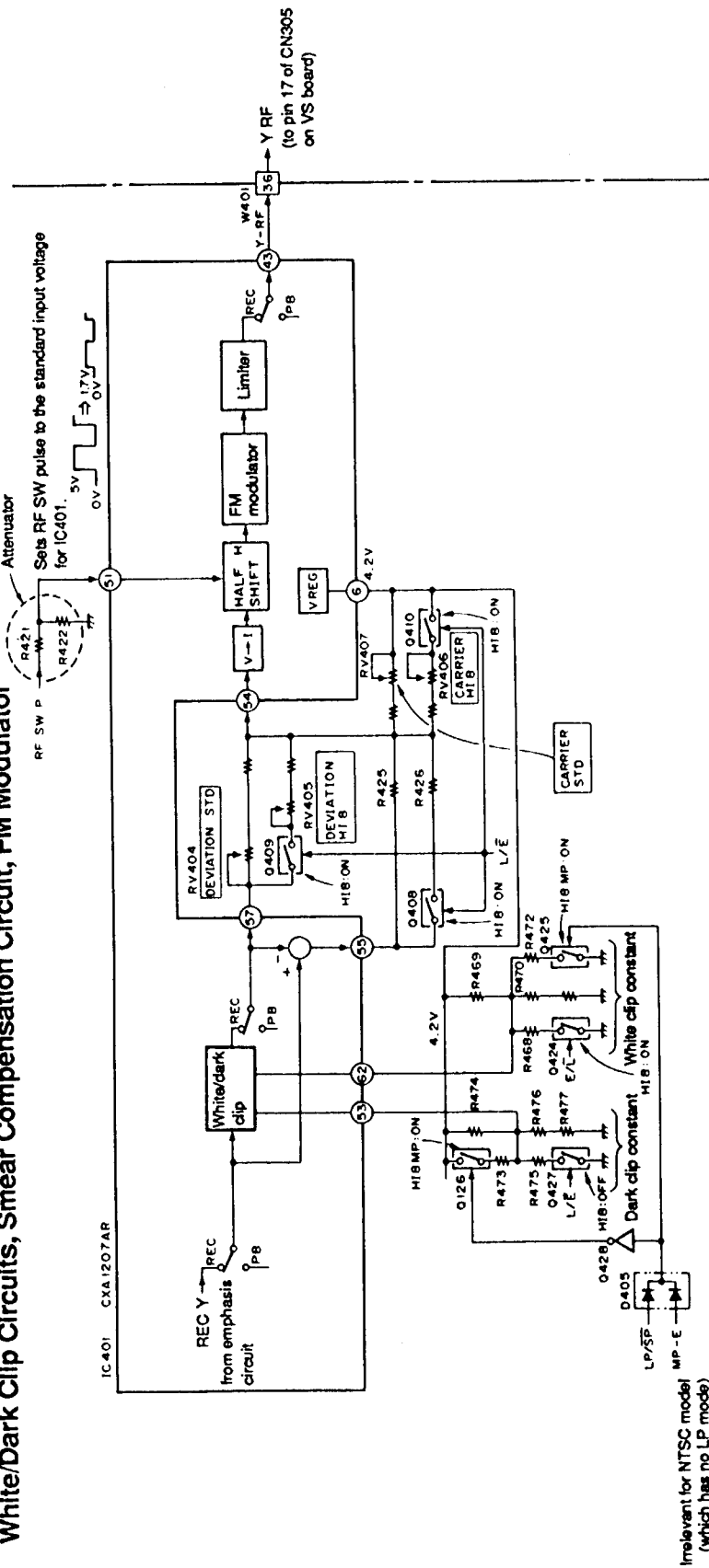


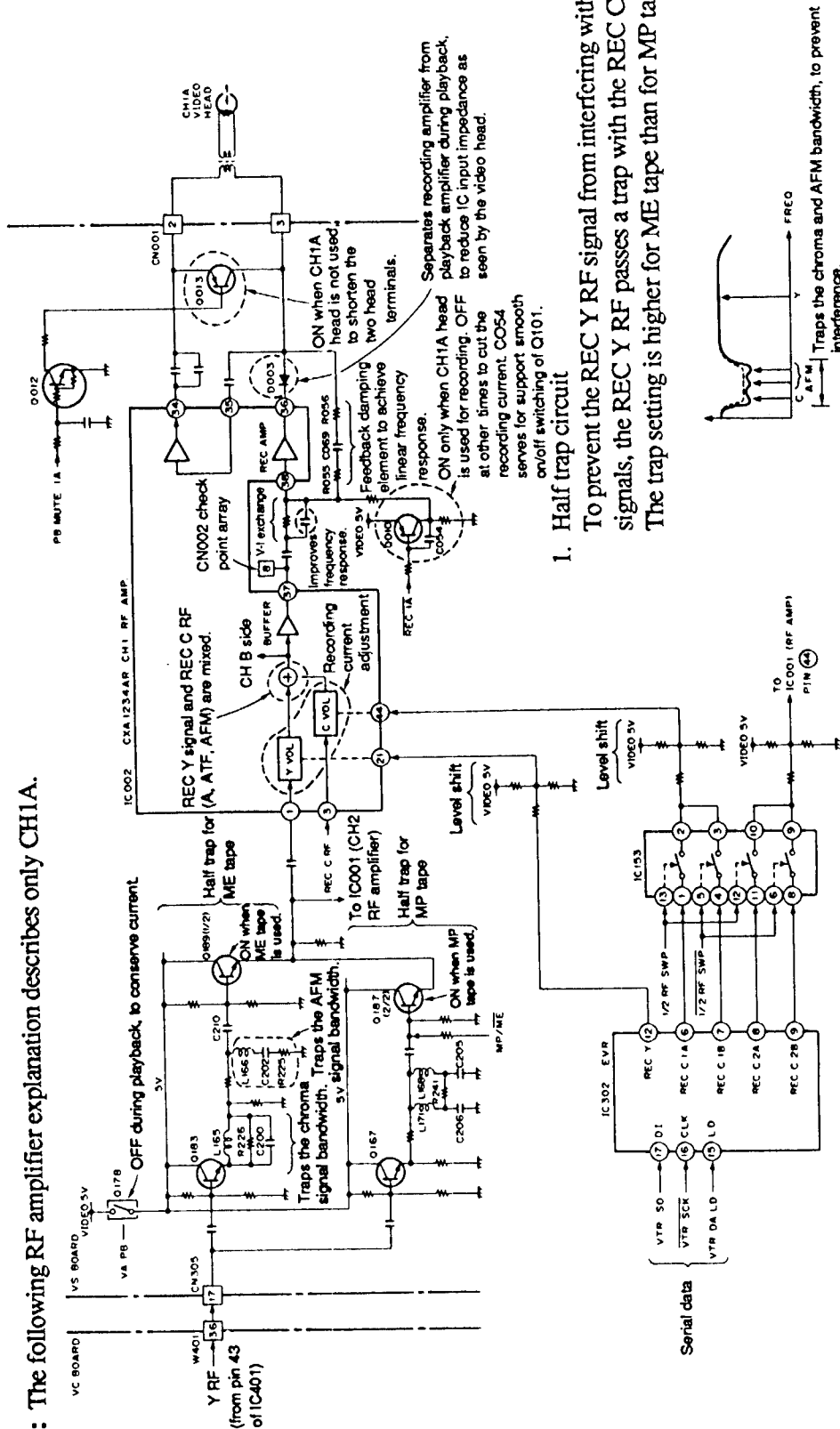
Fig. 3-6

- Fig. 3-6**
1. **White/dark clip circuits**
The white clip constant is determined by the circuit connected to pin 62 and the dark clip constant by the circuit connected to pin 53.
The clip ratio is altered for STD mode, Hi8 MP mode and Hi8 mode, to prevent overmodulation.
 2. **Smear compensation circuit**
The difference between the signal before and after white/dark clip is determined, and be subtracting the it from the signal after clipping, the waveform characteristics are improved.
In the Hi8 mode, Q408 goes ON to increase the amount of compensation.
 3. **Deviation, carrier set circuit**
The carrier frequency and deviation for modulation are determined by the current at pin 54. The adjustment of deviation and carrier is performed separately for the Hi8 and STD modes, therefore 4 VRs are required. The STD mode is to be adjusted first, and then the Hi8 mode.
 4. **FM modulator**
After V-to-I conversion, the Y signal enters the half-H shift circuit. Here the Y FM carrier is shifted by about 7.8 kHz (1/2 H) for each field. Recording the signal in this way makes it possible to remove adjacent-track crosstalk during playback by using the Y comb filter. After half-H shifting, the Y signal is frequency modulated and passes a hard limiter before being output from pin 43.

		Q426		Q427	Q424	Q425	Dark clip ratio	White clip ratio
		OFF		OFF	ON	OFF	-100%	200%
Hi8 ME mode		ON		OFF	ON	ON	-95%	190%
Hi8 MP mode		OFF		ON	OFF	OFF	-110%	230%

3-1-5. Half Trap Circuit and RF Amplifier

Note: The following RF amplifier explanation describes only CH1A.



1. Half trap circuit

To prevent the REC Y RF signal from interfering with the REC C/AFM signals, the REC Y RF passes a trap with the REC C/AFM bandwidth. The trap setting is higher for ME tape than for MP tape.

2. RF amplifier

- Recording current adjustment

The Y and chroma signals are adjusted in the RF amplifier for correct recording current. The adjustment is controlled by the EVR (IC302). The recording current for the chroma signal is switched by IC153, to allow separate adjustment for each head. The resistor in the output of IC153 serves to reduce the EVR output level (0 - 5 V) to 2 - 3 V.

Fig. 3-7

The diagram illustrates the video processing section of a color television receiver. It shows the flow of video signals from input to various processing blocks and output stages.

Input and Initial Processing:

- VIDEO I/O:** The input signal enters through a connector (4) and is split into **VIDEO I/O** and **VIDEO IN** paths.
- VS BOARD:** The **VIDEO I/O** signal passes through a block labeled **VS BOARD**.
- W401:** The **VIDEO IN** signal passes through a block labeled **W401**.
- Input/output selector:** The signal then enters an **Input/output selector** block, which also receives an **EE PB Y SIGNAL**.
- Q405:** The output of the selector passes through a block labeled **Q405**.

Processing and AGC:

- Clamping:** The signal enters a **CLAMP** block, which is part of an **AGC** (Automatic Gain Control) section.
- VCA:** The signal then passes through a **VCA** (Video Compression Amplifier) block.
- Clamping:** The signal enters another **CLAMP** block.
- DD5:** The signal then passes through a block labeled **DD5**.
- MUTE:** The signal then enters a **MUTE** block.
- EE PB Y:** The output of the **MUTE** block is labeled **EE PB Y**.

Signal Extraction and Output:

- Extraction of Y signal components:** The signal is split into two paths for extraction of Y signal components. One path goes through a **REC** (Recording) block, then a **S REC** (Signal Recording) block, and finally a **PB** (Phase Balance) block. The other path goes through a **REC** block, then a **S REC** block, and finally a **PB** block.
- Extraction of chroma signal components:** The signal is split into two paths for extraction of chroma signal components. One path goes through a **REC** block, then a **S REC** block, and finally a **PB** block. The other path goes through a **REC** block, then a **S REC** block, and finally a **PB** block.
- COMB:** The signal then enters a **COMB** (Comb) block.
- BPF:** The signal then enters a **BPF** (Band Pass Filter) block.
- Output:** The final output is labeled **Y**.

Other Components and Notes:

- IC 401 CXA1207AR:** A central integrated circuit is labeled **IC 401 CXA1207AR**.
- VC BOARPO:** A block labeled **VC BOARPO** is shown.
- Not used:** A note indicates that a certain path or component is **Not used**.
- Fixed during recording:** A note indicates that a certain component or setting is **Fixed during recording**.
- AGC:** The **AGC** (Automatic Gain Control) section is indicated.
- IC 551:** A block labeled **IC 551** is shown.
- RV551:** A block labeled **RV551** is shown.
- Y/C SD:** A block labeled **Y/C SD** is shown.
- Quadrupler:** A block labeled **Quadrupler** is shown.
- PSC:** A block labeled **PSC** is shown.
- CCD IN DELAY LINE:** A block labeled **CCD IN DELAY LINE** is shown.
- CLOCK:** A block labeled **CLOCK** is shown.
- EO:** A block labeled **EO** is shown.
- LPF:** A block labeled **LPF** is shown.
- 0555, FL551, 0556:** A block labeled **0555, FL551, 0556** is shown.
- 0557:** A block labeled **0557** is shown.
- 0558:** A block labeled **0558** is shown.
- 0559:** A block labeled **0559** is shown.
- 0560:** A block labeled **0560** is shown.
- 0561:** A block labeled **0561** is shown.
- 0562:** A block labeled **0562** is shown.
- 0563:** A block labeled **0563** is shown.
- 0564:** A block labeled **0564** is shown.
- 0565:** A block labeled **0565** is shown.
- 0566:** A block labeled **0566** is shown.
- 0567:** A block labeled **0567** is shown.
- 0568:** A block labeled **0568** is shown.
- 0569:** A block labeled **0569** is shown.
- 0570:** A block labeled **0570** is shown.
- 0571:** A block labeled **0571** is shown.
- 0572:** A block labeled **0572** is shown.
- 0573:** A block labeled **0573** is shown.
- 0574:** A block labeled **0574** is shown.
- 0575:** A block labeled **0575** is shown.
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- 0579:** A block labeled **0579** is shown.
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- 0587:** A block labeled **0587** is shown.
- 0588:** A block labeled **0588** is shown.
- 0589:** A block labeled **0589** is shown.
- 0590:** A block labeled **0590** is shown.
- 0591:** A block labeled **0591** is shown.
- 0592:** A block labeled **0592** is shown.
- 0593:** A block labeled **0593** is shown.
- 0594:** A block labeled **0594** is shown.
- 0595:** A block labeled **0595** is shown.
- 0596:** A block labeled **0596** is shown.
- 0597:** A block labeled **0597** is shown.
- 0598:** A block labeled **0598** is shown.
- 0599:** A block labeled **0599** is shown.
- 0600:** A block labeled **0600** is shown.
- 0601:** A block labeled **0601** is shown.
- 0602:** A block labeled **0602** is shown.
- 0603:** A block labeled **0603** is shown.
- 0604:** A block labeled **0604** is shown.
- 0605:** A block labeled **0605** is shown.
- 0606:** A block labeled **0606** is shown.
- 0607:** A block labeled **0607** is shown.
- 0608:** A block labeled **0608** is shown.
- 0609:** A block labeled **0609** is shown.
- 0610:** A block labeled **0610** is shown.
- 0611:** A block labeled **0611** is shown.
- 0612:** A block labeled **0612** is shown.
- 0613:** A block labeled **0613** is shown.
- 0614:** A block labeled **0614** is shown.
- 0615:** A block labeled **0615** is shown.
- 0616:** A block labeled **0616** is shown.
- 0617:** A block labeled **0617** is shown.
- 0618:** A block labeled **0618** is shown.
- 0619:** A block labeled **0619** is shown.
- 0620:** A block labeled **0620** is shown.
- 0621:** A block labeled **0621** is shown.
- 0622:** A block labeled **0622** is shown.
- 0623:** A block labeled **0623** is shown.
- 0624:** A block labeled **0624** is shown.
- 0625:** A block labeled **0625** is shown.
- 0626:** A block labeled **0626** is shown.
- 0627:** A block labeled **0627** is shown.
- 0628:** A block labeled **0628** is shown.
- 0629:** A block labeled **0629** is shown.
- 0630:** A block labeled **0630** is shown.
- 0631:** A block labeled **0631** is shown.
- 0632:** A block labeled **0632** is shown.
- 0633:** A block labeled **0633** is shown.
- 0634:** A block labeled **0634** is shown.
- 0635:** A block labeled **0635** is shown.
- 0636:** A block labeled **0636** is shown.
- 0637:** A block labeled **0637** is shown.
- 0638:** A block labeled **0638** is shown.
- 0639:** A block labeled **0639** is shown.
- 0640:** A block labeled **0640** is shown.
- 0641:** A block labeled **0641** is shown.
- 0642:** A block labeled **0642** is shown.
- 0643:** A block labeled **0643** is shown.
- 0644:** A block labeled **0644** is shown.
- 0645:** A block labeled **0645** is shown.
- 0646:** A block labeled **0646** is shown.
- 0647:** A block labeled **0647** is shown.
- 0648:** A block labeled **0648** is shown.
- 0649:** A block labeled **06**

Frequency spectrum plot showing a peak at 10.7 MHz and a sideband at 14 MHz. The plot is labeled with "FREQ" on the y-axis and "10.7 MHz" and "14 MHz" on the x-axis. A dashed line indicates the carrier frequency f_c . Arrows point from the text "Secondary component" and "Clock component To EE block" to the peaks at 10.7 MHz and 14 MHz respectively.

- 1H CCD delay line
The 1H CCD delay line uses the clock input from pin 8. This clock is an FSC signal (3.58 MHz) output by the IC501 (chroma signal processing) which is quadrupled for use.
- LPF — Q255, FL551
This low-pass filter removes the clock component of the 1H CCD delay line. The cutoff frequency is approx. 6 MHz

3-2. Chroma Signal Recording Circuitry

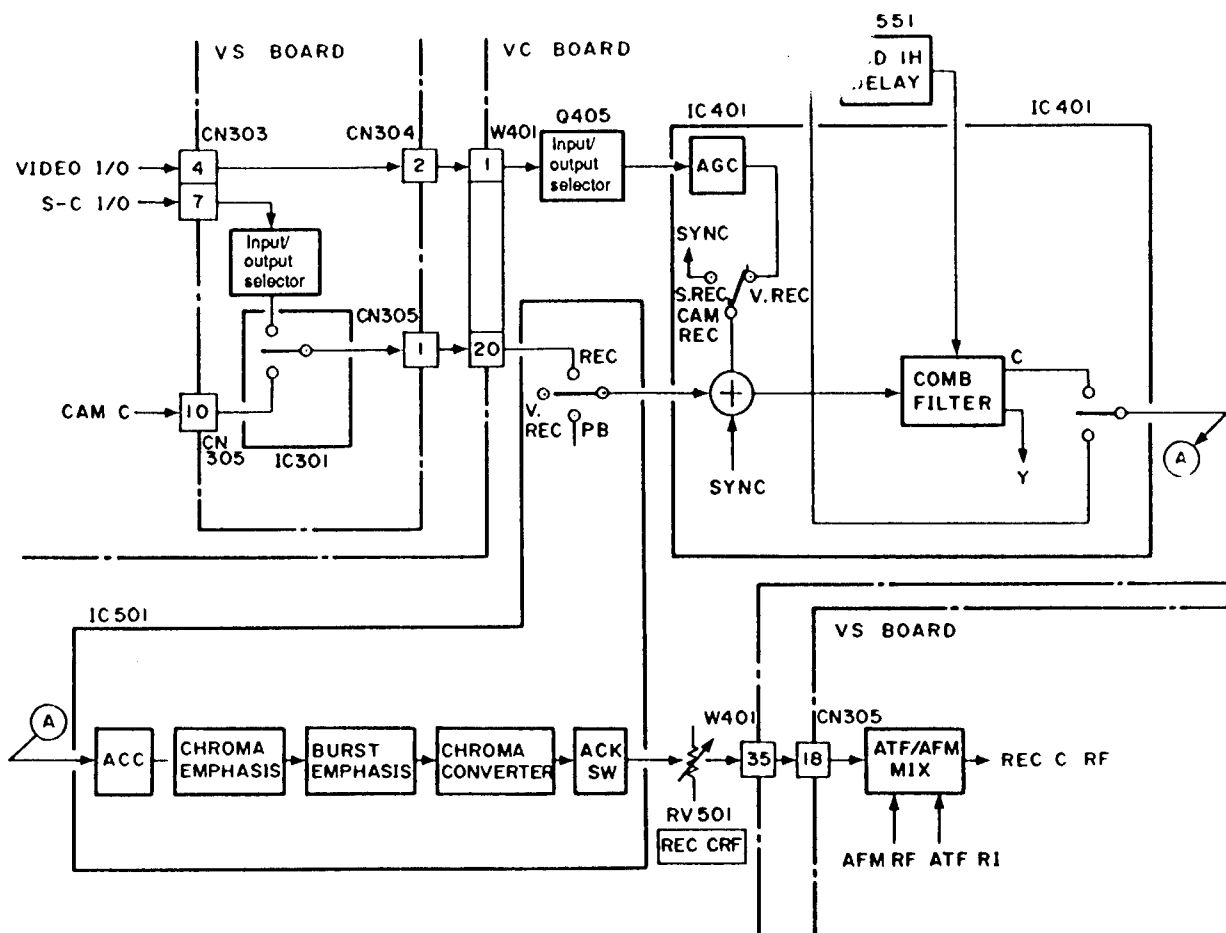


Fig. 3-9

3-2-1. Chroma Signal Path During S Input Recording and Camera Recording

* During use of the video input, the signal is output from pin 13 of IC401 after Y/C separation in IC 401. Otherwise, the signal path is the same.

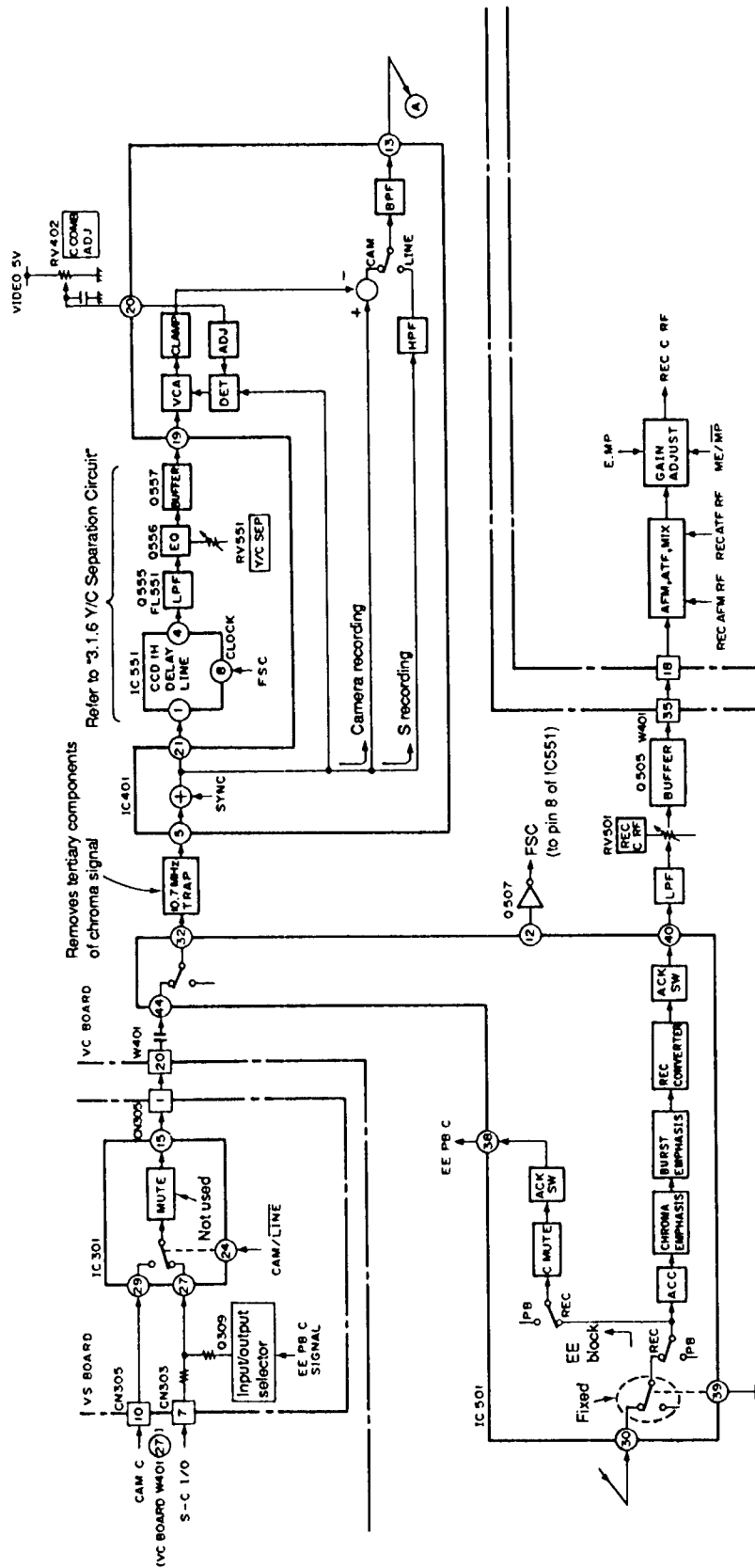


Fig. 3-10

(1) Chroma comb filter

In this unit, chroma comb filter processing is carried out by the video circuitry for camera recording. During recording from the S input, no comb filter processing is carried out.

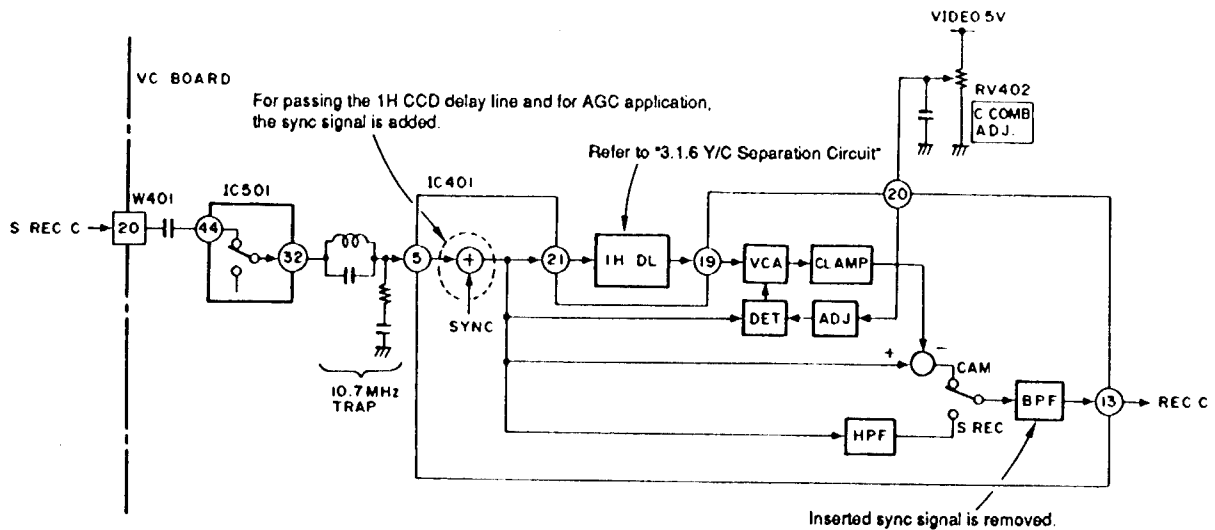


Fig. 3-11

(2) Chroma converter

Down-converts the 3.58 MHz chroma signal input into 743 kHz.

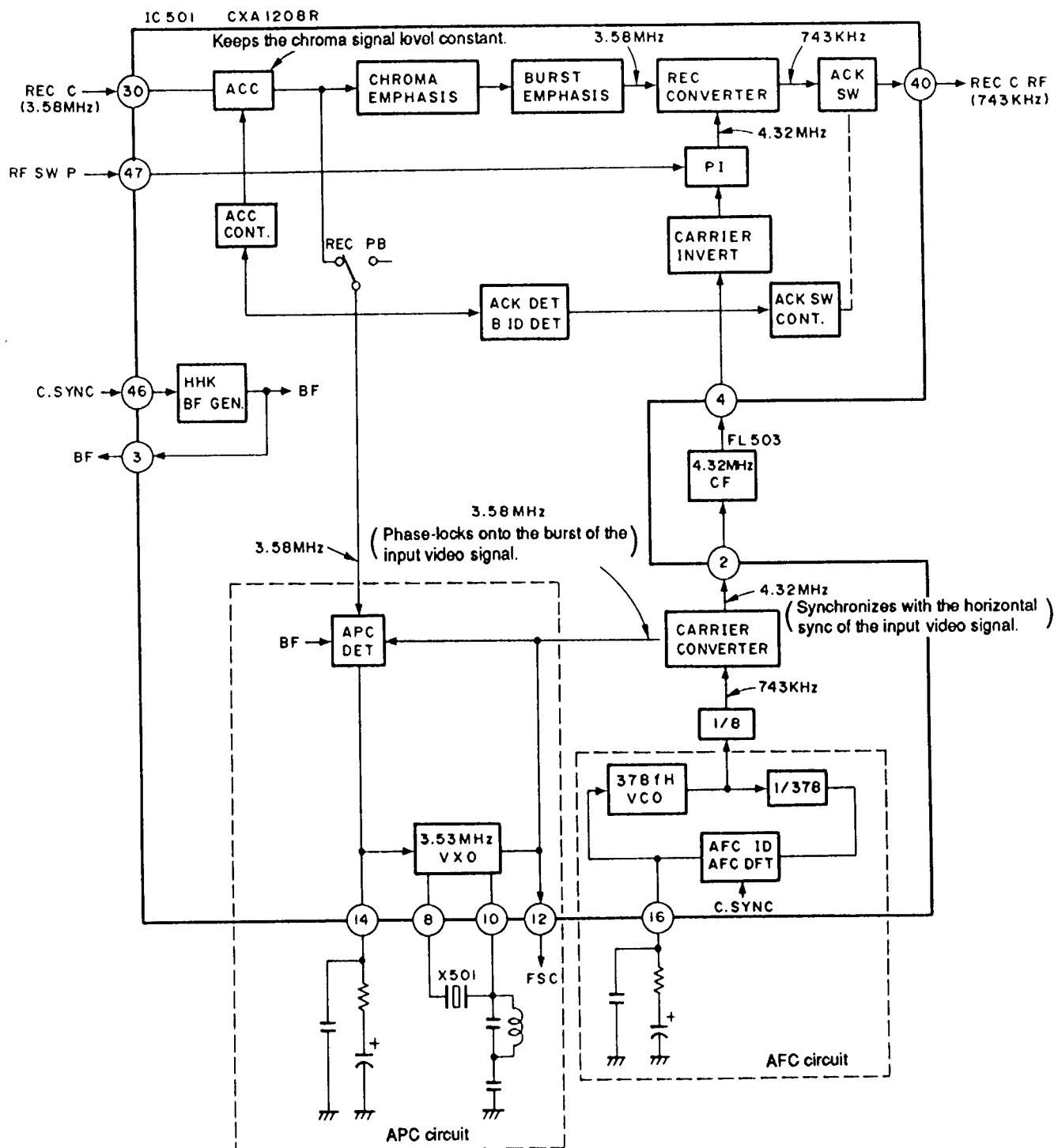


Fig. 3-12

(3) Circuitry after pin 40 of IC501

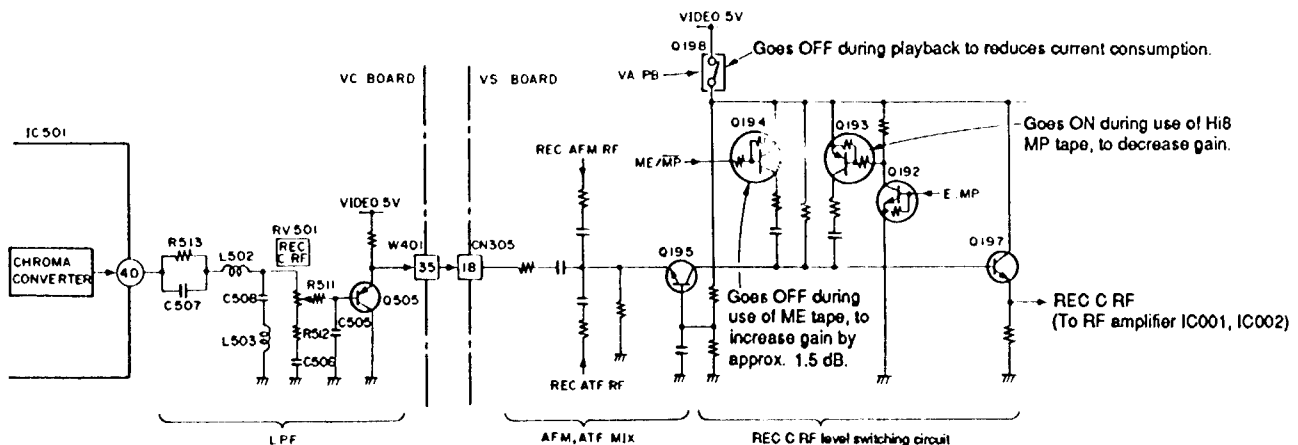
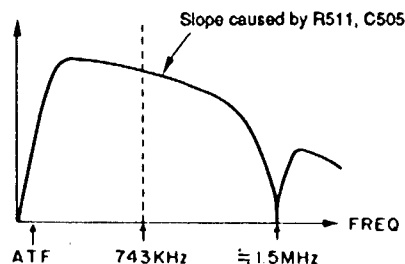


Fig. 3-13

1. Low-pass filter

Since the down-converted signal contains harmonics, a low-pass filter is used to remove them. The filter also reduces the bandwidth in the range of the AFM carrier.

In order to compensate for the characteristics of the rotary transformer before the video head (attenuation of low frequencies), the low frequency range is somewhat emphasized by the filter.



RV501 adjusts the chroma signal level before mixing with the AFM and ATF signals. (The recording current adjustment after mixing is performed by the RF amplifier, as described in section 3.1.1 (4).)

2. AFM, ATF mixer, REC C RF level switching circuit

The AFM and ATF signals are mixed in a resistor network. Q192 to Q194 switch the chroma signal level depending on the tape type.

3-3. Y Signal Playback Circuitry

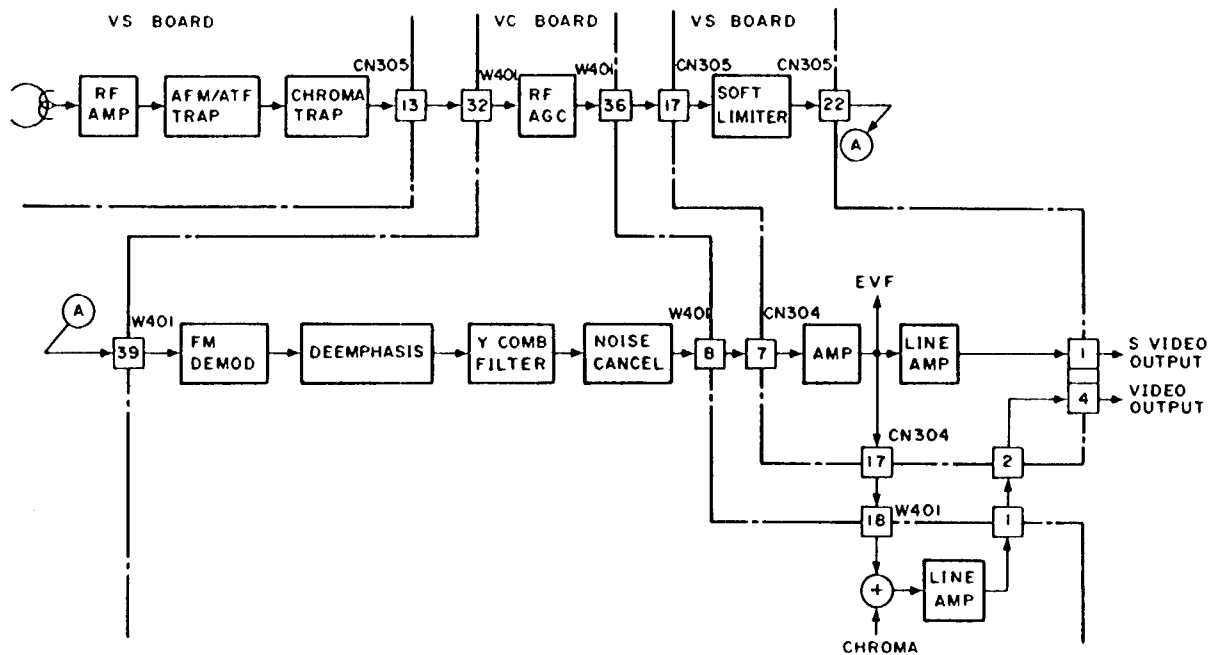


Fig. 3-14

3-3-1. RF Amplifier

Note: The following explanation describes only CH1A.

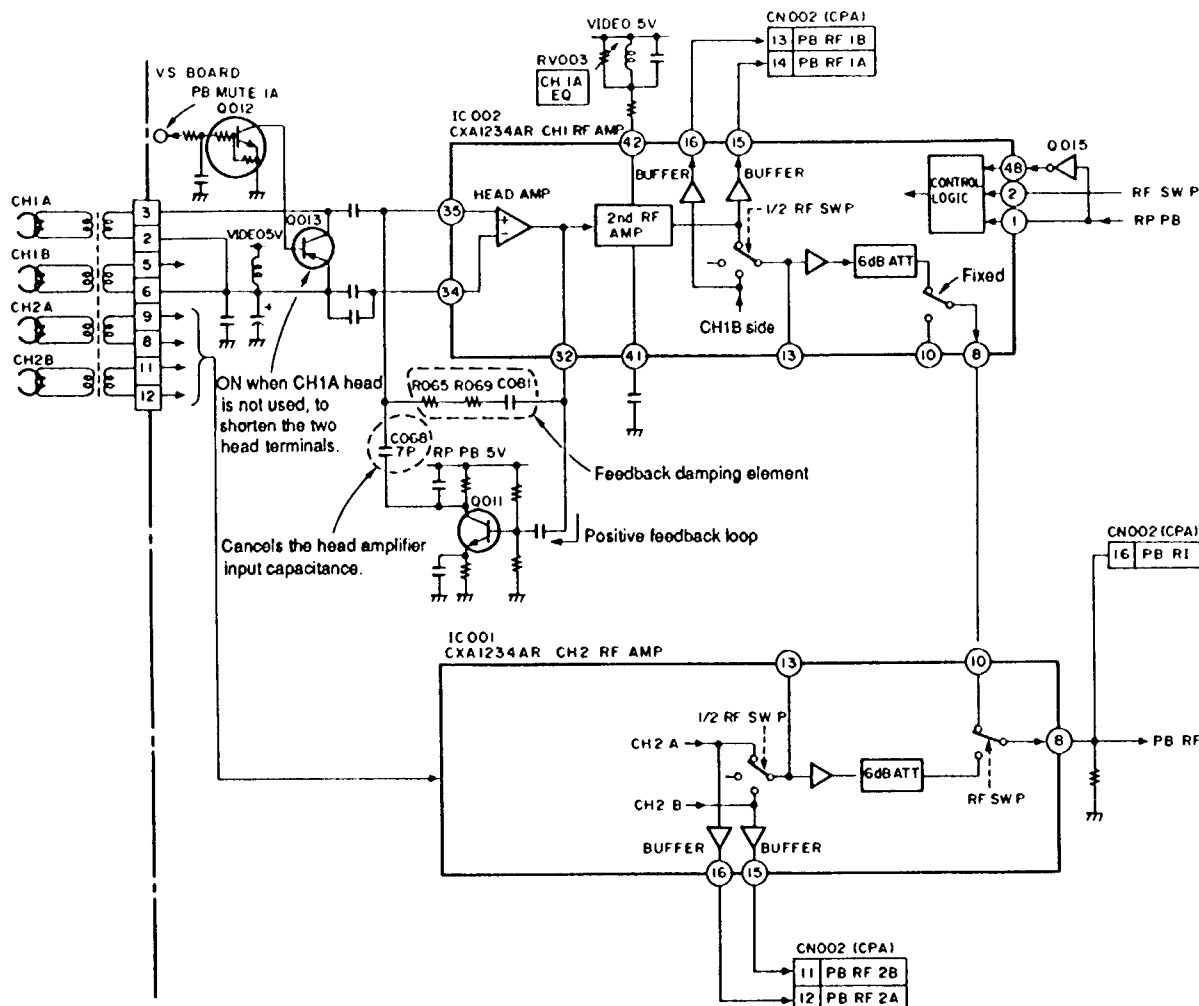
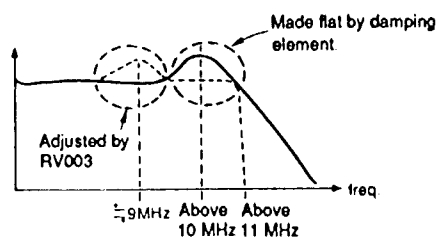


Fig. 3-15

1. Feedback damping, positive feedback loop

The input capacitance as seen by the head amplifier is canceled and positive feedback is applied in order to extend high frequency response. The feedback damping element also improves frequency response linearity.



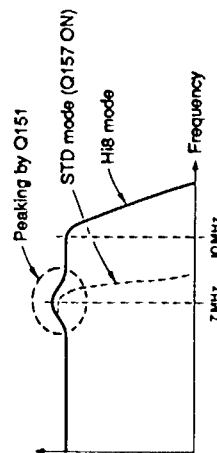
2. RV003

The circuit is designed to peak in the vicinity of 9 MHz, in order to prevent frequency response degradation in the subsequent signal processing circuits. RV003 serves to adjust the peaking ratio. The measurement point for adjustment is pin 16 of CN002 on PB RF.



[RF peaking and trap]

[RF peaking and trap]
Cuts unwanted bandwidth and performs slight peaking.



[Hi8 mode soft limiter]

There are separate soft limiter circuits for Hi8 and STD mode. The circuit shown below is used only during playback. During recording, Q178 (see "3.3.2 AFM, ATF, Chroma Trap") goes OFF and thereby cuts the power supply. (During recording and in the EE mode, it reduces the current consumption.)

[STD mode soft limiter]

[Hi8 mode and STD mode switching]

This circuit switches between the L/E signal input to the base of the right side of Q177 and the L/E signal input to the base of Q201.

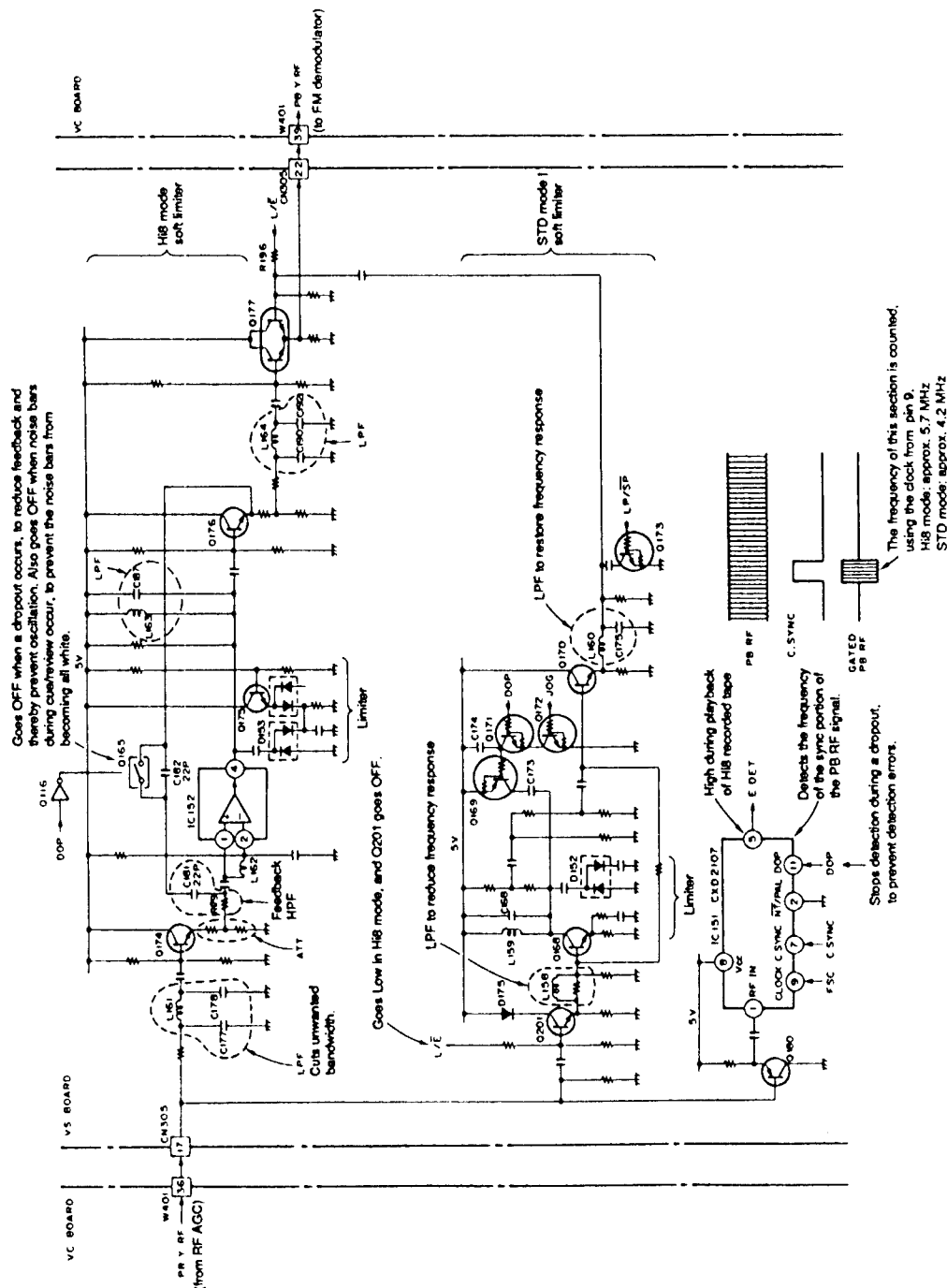


Fig. 3-17

3-3-4. FM Demodulator and Low-pass Filter

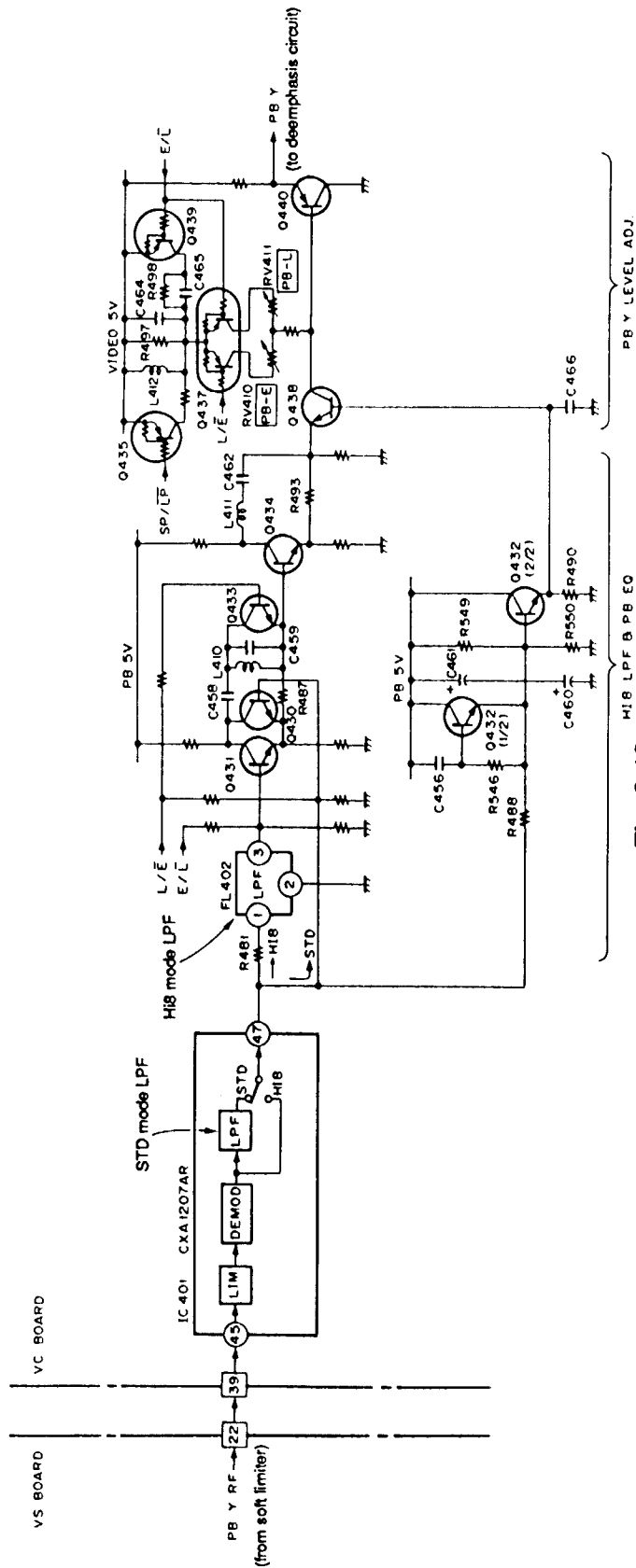


Fig. 3-18

[IC401]

In standard mode, the PB Y signal is routed through the low-pass filter and output from pin 47. In Hi8 mode, the low-pass filter is not used.

[Hi8 LPF and PB EQ]

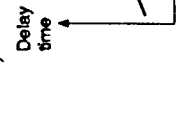
- Hi8 mode

The signal passes FL402 and is input to the equalizer Q431. In Hi8 mode, Q430 is switched OFF by the L/E signal. Since Q433 also goes OFF, L410 and C439 are active.

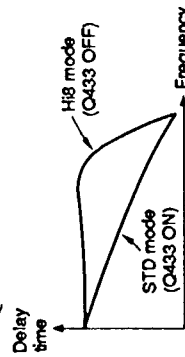
- STD mode

In STD mode, the signal passes through the low-pass filter in IC401 and not through FL402. Q431 is switched OFF by the E/L signal. Q433 is switched ON, shorting L410 and C459, thereby changing the equalizer characteristics.

Delay characteristics of LPF in IC401 (for STD mode)



Delay characteristics of equalizer formed by Q431 and Q430



In STD mode, the delay characteristics become flat, through combination of the two curves. In Hi8 mode, the delay characteristics of the LPF (FL402) are approximately flat.

[Q434 equalizer]

Performs delay matching with the chroma signal and improves waveform reproducibility.

[Q438 base connected amplifier]

The bias of this base connected amplifier uses the DC level of pin 47 of IC401. Q432 (1/2) forms a differentiation circuit with C456 and R546 that improves the bias rise speed during switching from stop to playback. Q432 (2/2) is a buffer for the bias power supply.

[PB Y level adjustment]

The level can be adjusted separately for the Hi8 mode and STD mode. L412, R497 and C464 serve for peaking of the range which was attenuated in the RF block. Q439 goes ON in the STD mode to reduce the peaking frequency. Q435 goes ON in the LP playback mode to reduce the peaking ratio.

3-3-5. Deemphasis Circuit, Y Comb Filter

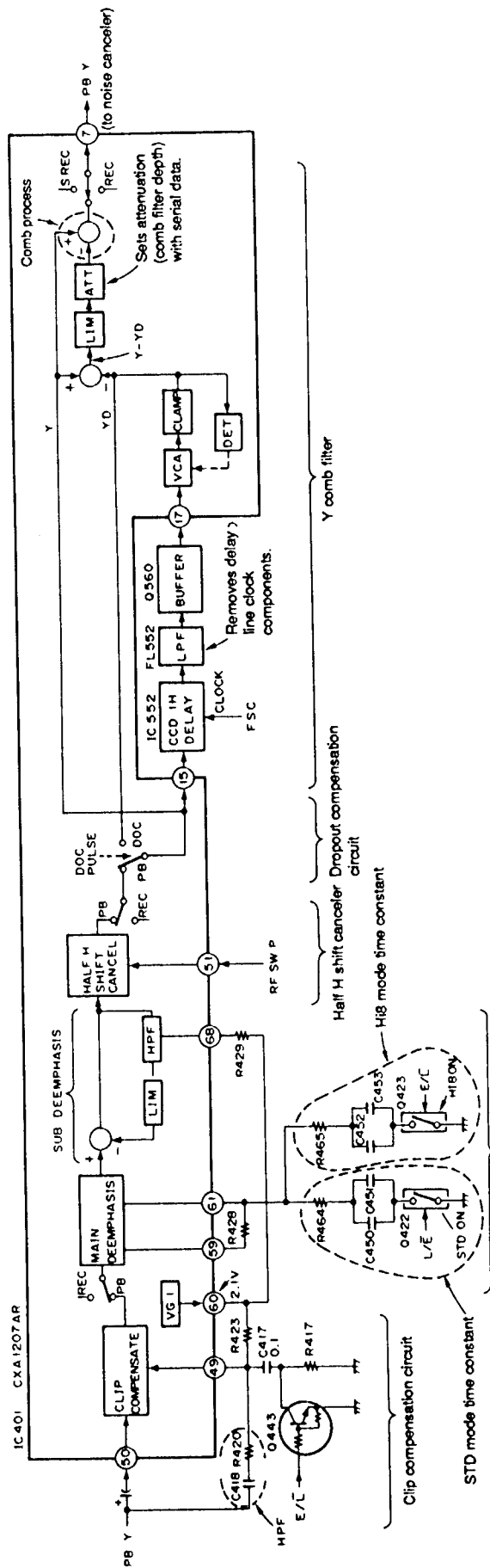


Fig. 3-19

[Clip compensation circuit]

Returns the signal which was subject to white/dark clipping during recording to the original form. The signal first is routed through a high-pass filter and then input to pin 49. In Hi8 mode, Q443 goes ON and alternately connects pin 49 to ground. Clip compensation is therefore not carried out.

[Deemphasis circuit]

Performs reverse signal processing than during recording.

[Half H shift canceler]

The effect of the half H shift (approx. 7.8 kHz) that was applied on the Y signal during recording is canceled by this circuit. This allows removal of adjacent-track crosstalk components by the Y comb filter.

[Dropout compensation circuit]

The dropout pulse (generated when a dropout occurs) causes output of the signal 1 H before the dropout. This makes dropouts less noticeable.

[Y comb filter]

Y signal crosstalk from adjacent tracks is detected using a 1H delay line and subtracted from the main signal, to cancel the effects of crosstalk.

Compensation: For the chroma signal, PI (phase inversion with a 1H cycle) is used to cancel crosstalk effects.

3-3-6. Noise Canceler

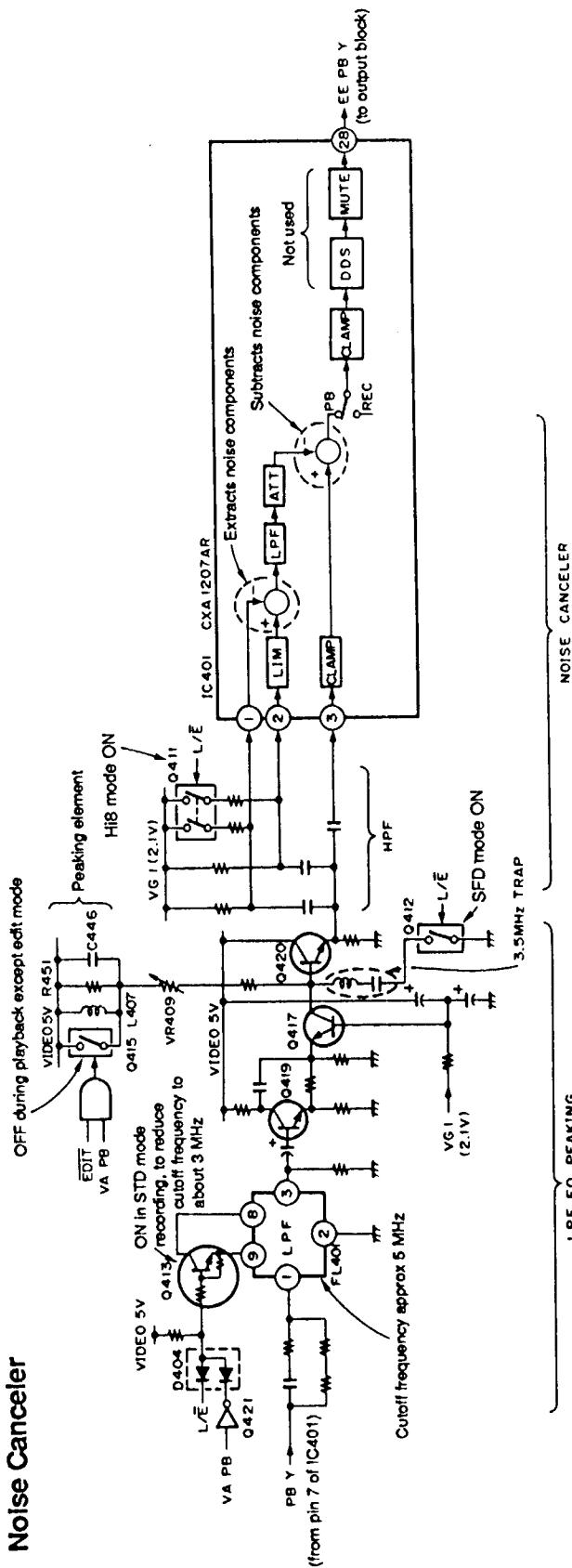


Fig. 3-20

[LPF, EQ, peaking circuits]

After the low-pass filter to remove unwanted bandwidth components, the equalizer performs delay matching. The peaking circuit emphasizes the medium frequency range.

[Noise canceler]

In Hi8 mode, Q411 is ON which raises the HPF cutoff frequency and reduces the input level of pins 1 and 2, to reduce the noise cancel amount.

3-3-7. Input/Output Circuitry

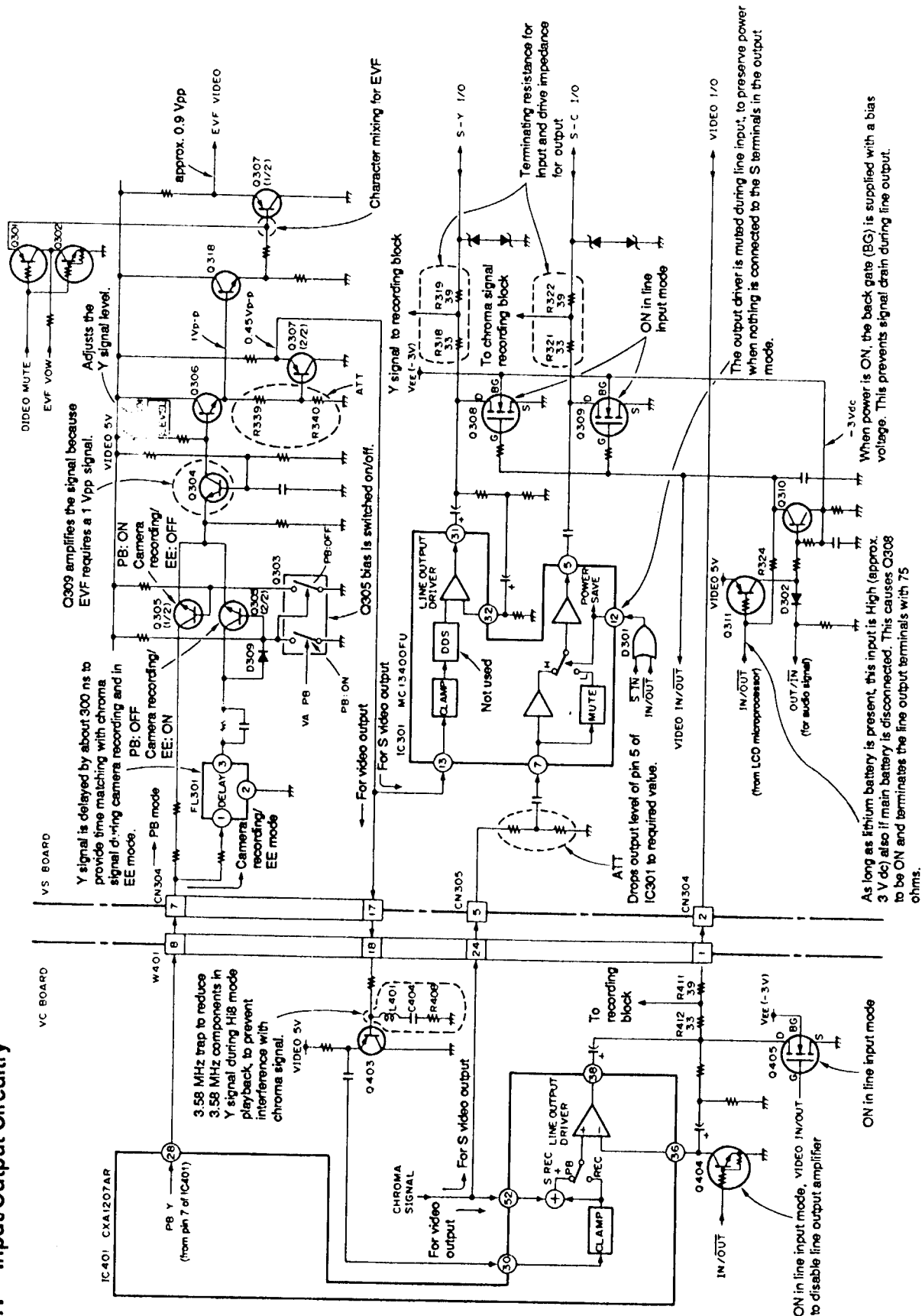


Fig. 3-21

3-4. Chroma Signal Playback Circuitry

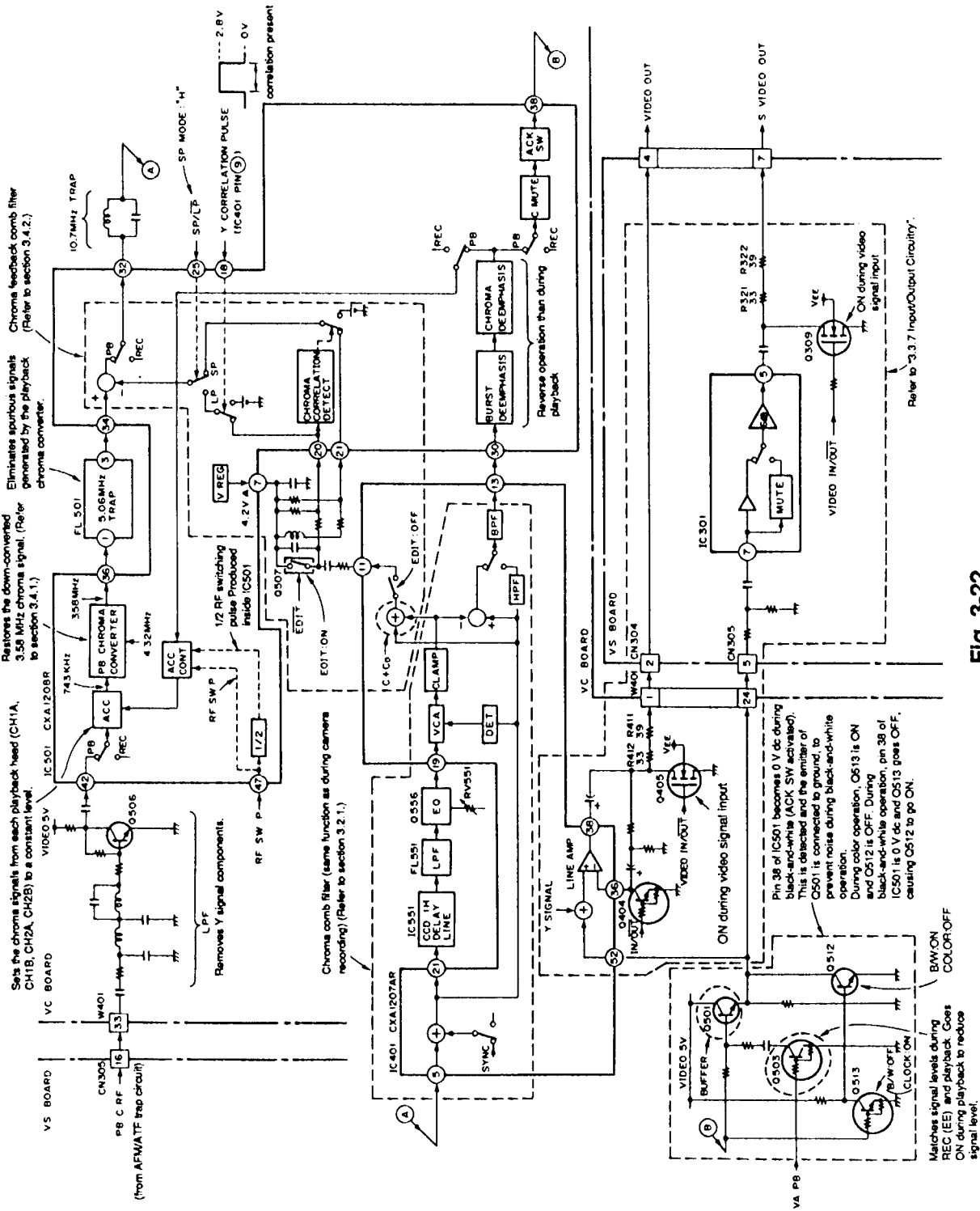


Fig. 3-22

3-4-1. Chroma Converter

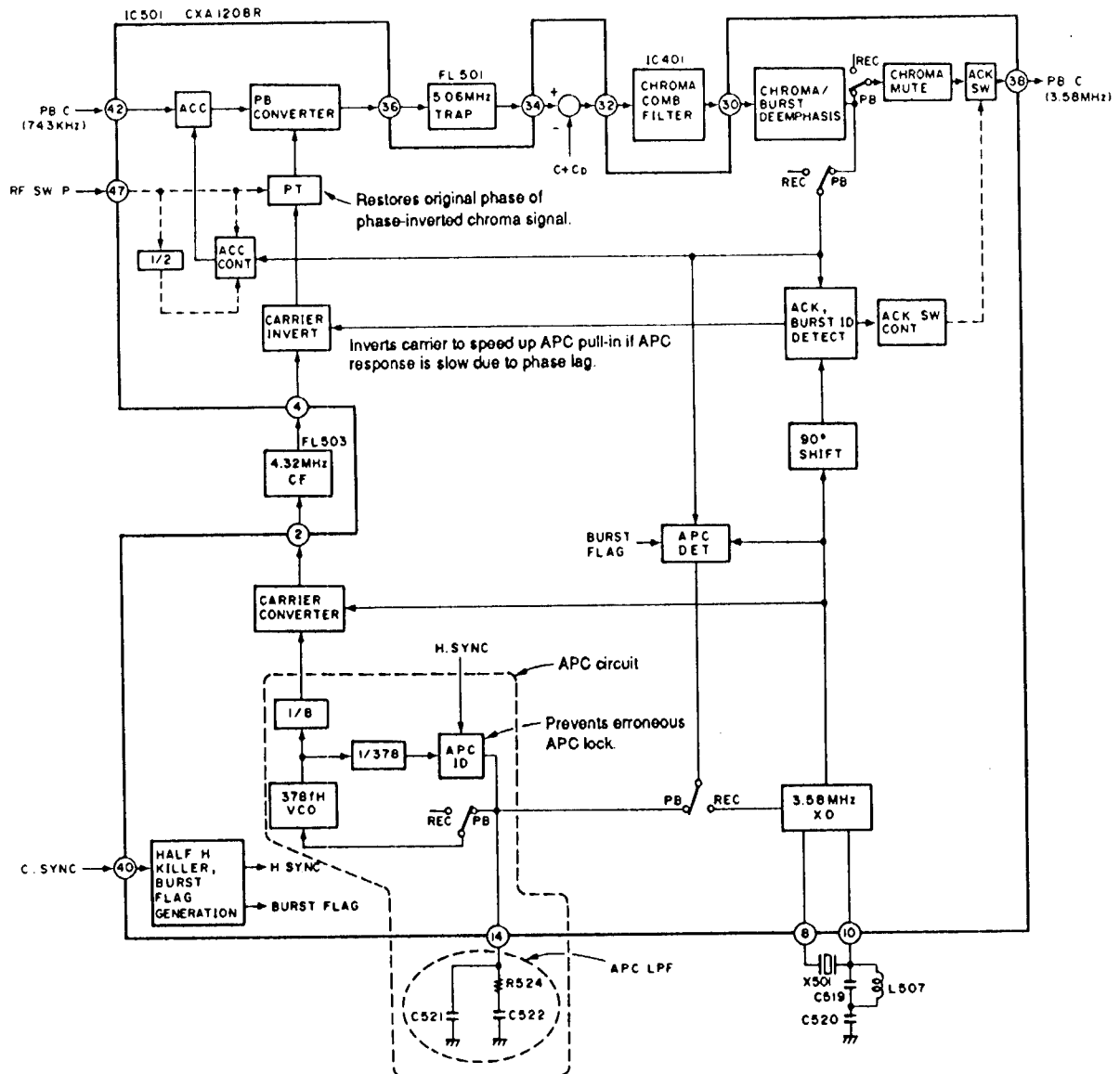


Fig. 3-23

3-4-2. Chroma Signal Feedback Comb Filter

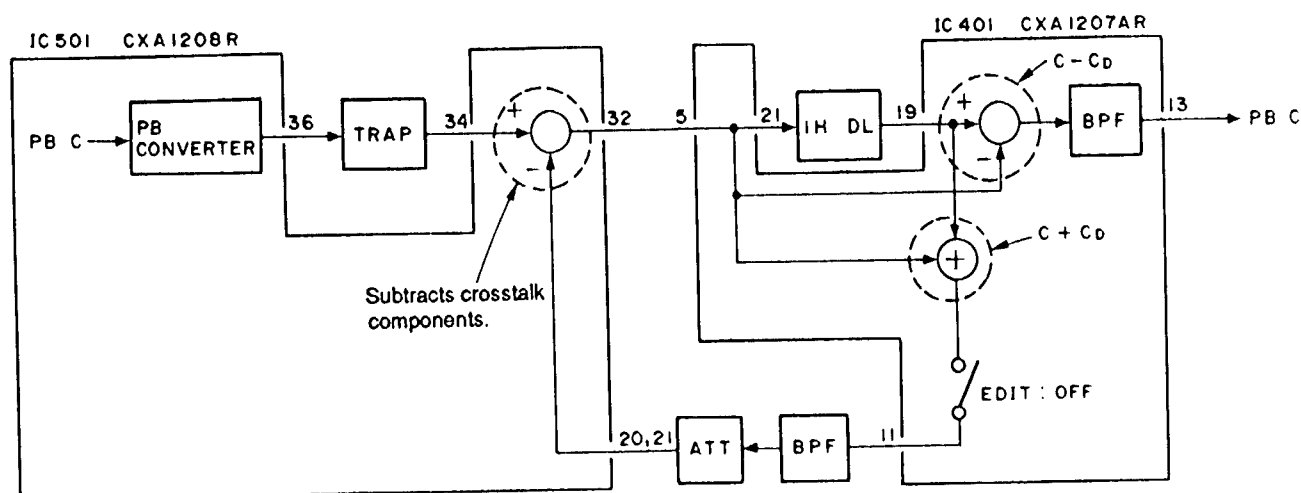
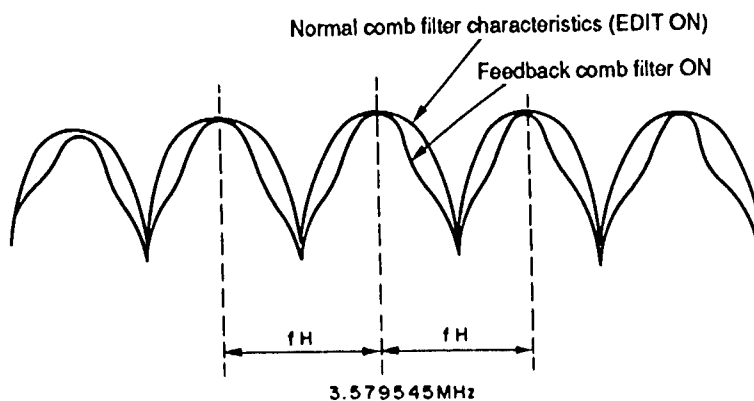


Fig. 3-24

The configuration of the chroma signal feedback comb filter is shown in Fig. 3-24. The 1H delayed signal and the signal before delay are added and a band-pass filter extracts the noise (crosstalk components) which are then subtracted from the main signal, for noise canceling. The noise cancel amount is different for the SP and LP mode. For sections without correlated contents (no line correlation) and in the edit mode, noise canceling is not carried out.



3-5. Video Circuitry Power Supply

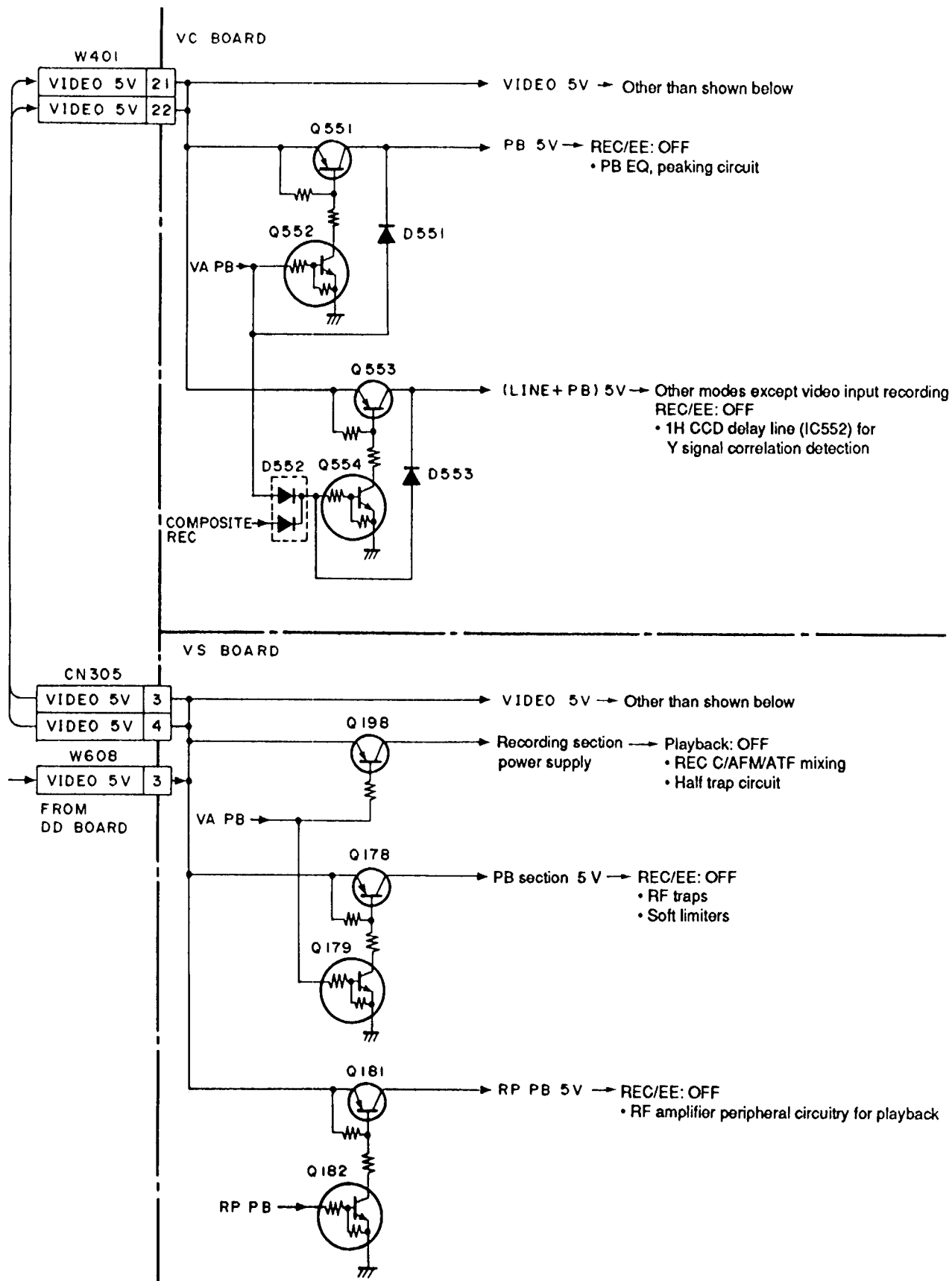


Fig. 3-25

4. SERVO AND SYSTEM CONTROL CIRCUITS

4-1. System Configuration

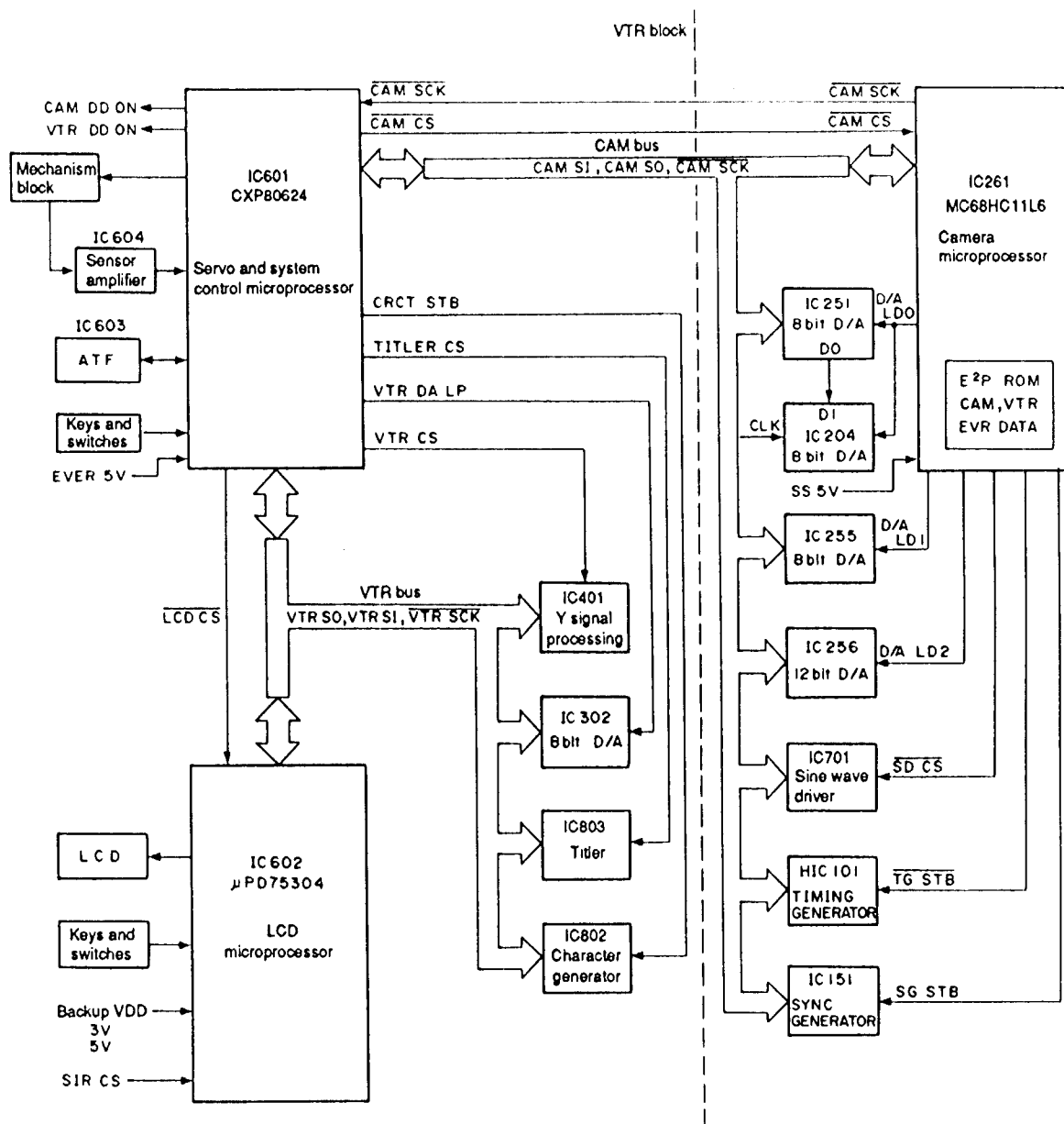


Fig. 4-1

[Serial data transfer]

All data transfer operations use V synchronization.

1. VTR mode

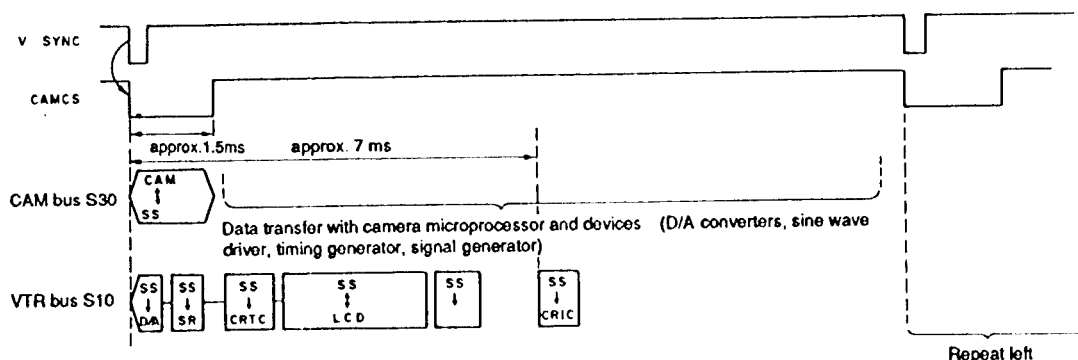
- When an external signal is present in the EE mode (Rec, Stop, etc.):
SS microprocessor (IC601) locks onto V sync of the external signal.
- When no external signal is present in the EE mode (Stop, etc.):
SS microprocessor (IC601) generates a self-drive V sync signal (with a longer cycle than the standard V sync).
- Playback (PB, Still, Cue/Rev, and camera modes Rec Rev, Edit Search):
SS microprocessor (IC601) generates a self-drive V sync signal (INT-V).

2. CAM mode (excluding Rec Rev, Edit Search)
SS microprocessor (IC601) locks onto V sync of the camera.

In all of the above modes, the internal V sync (INT-V) of the SS microprocessor is used to synchronize data transfer.

[Data transfer timing chart]

- The master for the camera bus is the camera microprocessor (IC261) which supplies the serial clock and the chip select signals for the devices. For communication with the SS microprocessor, the SS microprocessor outputs a $\overline{\text{CAM}}$ $\overline{\text{CS}}$ signal which is used by the camera microprocessor to produce the serial clock. After communication with the SS microprocessor is completed, the camera microprocessor establishes V sync by communicating with the various camera devices in turn.
- The master for the VTR bus is the SS microprocessor (IC601) which supplies the serial clock and the chip select signals for the devices. When the SS microprocessor starts communicating with the camera microprocessor on the camera bus, the VTR bus sequentially communicates with the various devices, as described above. Since the character generator has a large amount of data to move, data transfer is performed twice within one field. As with the camera bus, the VTR bus uses the V sync signal for synchronization.



4-2. Servo Block

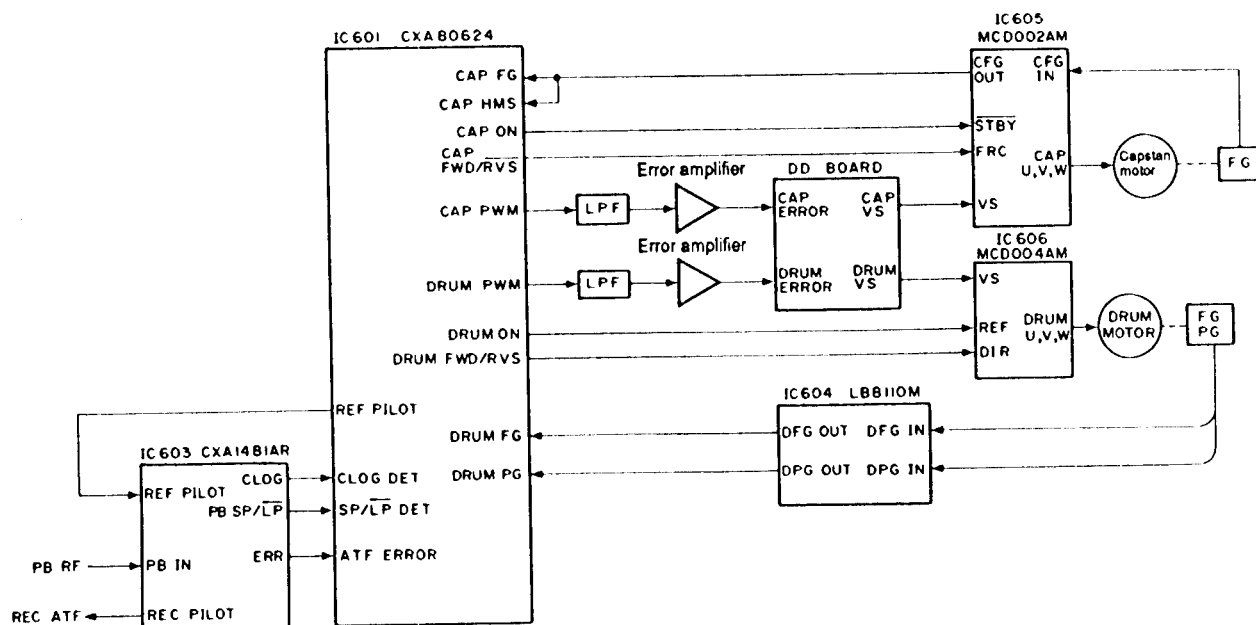


Fig. 4-2

[Low-pass filter]

The drum error signal (PWM signal) output from pin 76 of IC601 is routed through a low-pass filter to extract the DC components and produce the drum servo error voltage.

The drum error signal is amplified by the current amplifier on the DD board and input to IC606 (drum motor driver) as the DRUM VS signal.

[Drive circuit]

The drum servo error voltage (DRUM VS) is input to pins 13 and 19 of IC606. This voltage is used to control the drive amplifier output current, that is the drive voltage supplied to the drum motor drive coils.

The three drive coils U, V, W must be switched according to the drum motor rotation phase. The phase is detected by using the counterelectromotive force generated in the motor coil which is supplied to pins 20 - 23. Switching is performed by a three-phase switch.

The current detection terminal pin 15 and current setting terminal pin 1 are compared, to limit the current to about 560 mA.

4-2-2. Capstan Servo Circuit

A) Capstan servo FG amplifier

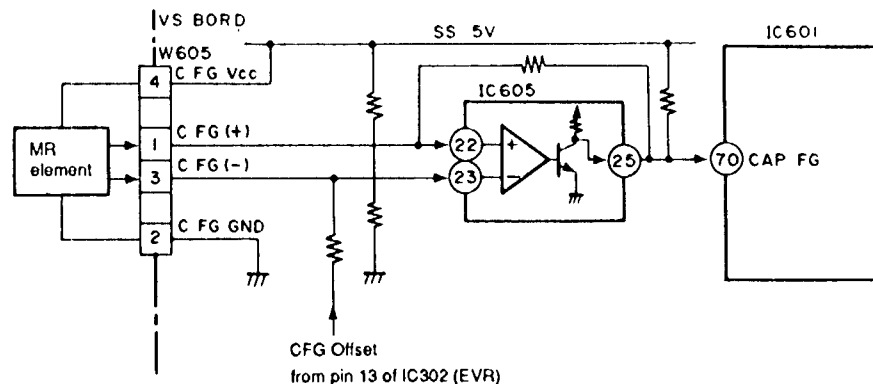


Fig. 4-5

The rotation of the capstan rotor MR element induces a sine wave signal (approx. 820 Hz in SP mode) in the MR element. After passing the differential amplifier and waveform rectifier in IC605, the signal is supplied to pin 70 of IC601. The capstan servo signal has 360 cycles for each rotation of the capstan.

B) Drive circuit

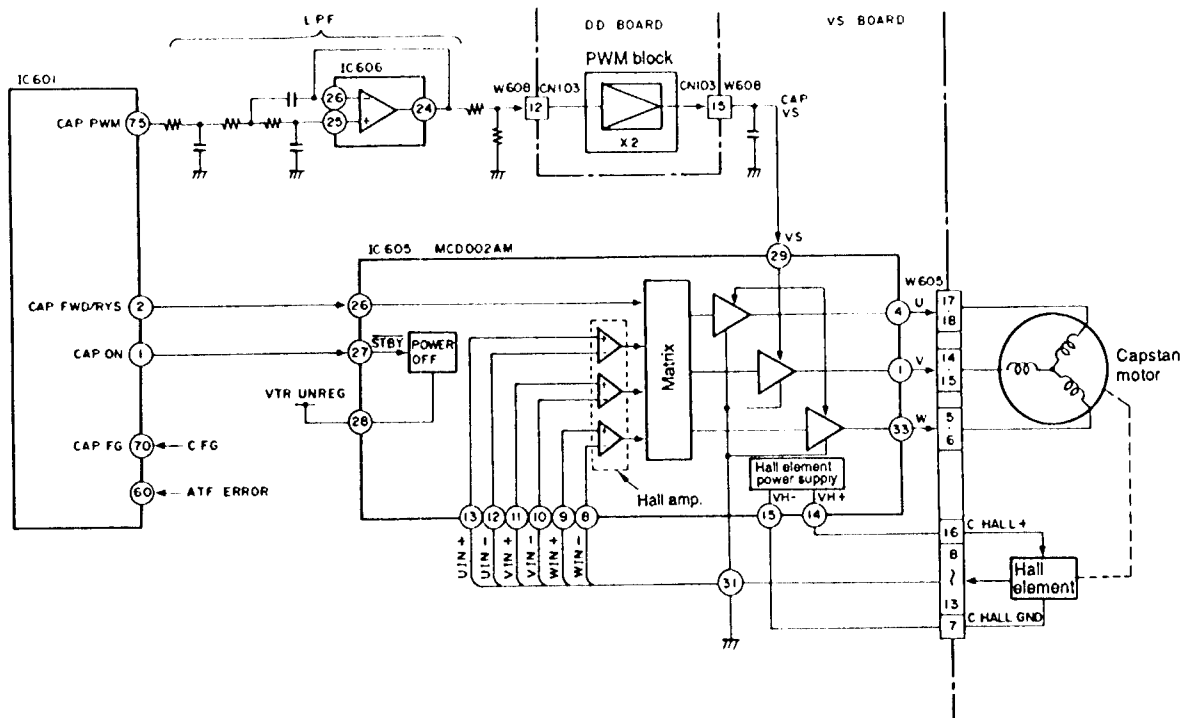


Fig. 4-6

[Low-pass filter]

The capstan error signal (PWM) signal output from pin 75 of IC601 is routed through a low-pass filter to extract the DC components and produce the servo error voltage. The capstan error signal is amplified by the current amplifier on the DD board and input to IC605 (capstan motor driver) as the CAP VS signal.

[Drive circuit]

The capstan servo error voltage (CAP VS) is input to pin 29 of IC605. This voltage is used to control the drive voltage supplied to the capstan motor drive coils.

The three drive coils U, V, W must be switched according to the capstan motor rotation phase. The phase is detected by using a Hall element and switching the drive amplifier accordingly.

4-3. System Control Block

[Pin description of servo and system control microprocessor IC601 (CXP80624)]

Pin no.	Signal name	I/O	Function																			
1	CAP ON	O	Capstan motor driver on/off control. High = ON.																			
2	CAP FWD/RVS	O	Indicates capstan motor rotation direction. High = forward.																			
3	RP PB	O	RF amplifier REC/PB switching. High = PB mode.																			
4	FE ON	O	Flying erase head on/off control. Low = ON.																			
5	JOG VD	O	Altered-speed playback VD signal output																			
6	JOG	O	Altered-speed playback control. High = JOG mode.																			
7	CAM RESET	O	Camera microprocessor reset signal. Normally High.																			
8	CAM/LINE	O	Input switching signal. High = camera input.																			
9	VTR DD ON	O	VTR block DC/DC converter on/off control. High = ON.																			
10	CAM DD ON	O	Camera block DC/DC converter on/off control. High = ON.																			
11	CAM CS	O	Camera serial bus chip select signal																			
12	MODE SW C	I	3-bit signal for mechanism position detection (mode switch)																			
13	MODE SW B																					
14	MODE SW A																					
15	START/STOP SW	I	Start/stop switch input			These signals are read also during power OFF (standby). Microprocessor wakes up at falling edge.																
16	EJECT SW	I	Eject switch input																			
17	CAM POWER SW	I	3-position switch camera mode input																			
18	VTR POWER SW	I	3-position switch VTR mode input																			
19	CC LOCK SW	I	Cassette control lock switch input																			
20	LANC POWER ON	I	Power-on input for LANC control. Falling edge = power ON.																			
21	DEW DET	I	DEW detection input. Low = DEW. Not active during power OFF.																			
22	LM LIM ON	I	Detects loading motor driver limiter operation. Loading is stopped 2 seconds after falling edge.																			
23	S RAM CS	O	High when title memory SRAM (IC801) was operated.																			
24	VIDEO CS	O	Chip select signal output for serial communication with Y signal processing IC																			
25	CRTC STB	O	Strobe signal output for serial communication with character generator																			
26	AUDIO MUTE	O	Audio mute signal. High = Mute.																			
27	TITLER CS	O	Chip select signal output for serial communication with digital titler (IC803)																			
28	LCD CS	O	Chip select signal output for serial communication with LCD microprocessor (IC602)																			
29	VTR DA LD	O	Strobe signal for 8-bit D/A converter (EVR) in VTR block																			
30	N.C.	—																				
31	UNLOAD	O	Loading motor driver control signal output																			
32	LOAD	O	<table><tr><td></td><td>OFF</td><td>LOADING</td><td>UNLOADING</td><td>BRAKE</td></tr><tr><td>UNLOAD</td><td>L</td><td>L</td><td>H</td><td>H</td></tr><tr><td>LOAD</td><td>L</td><td>H</td><td>L</td><td>H</td></tr></table>						OFF	LOADING	UNLOADING	BRAKE	UNLOAD	L	L	H	H	LOAD	L	H	L	H
				OFF	LOADING	UNLOADING	BRAKE															
			UNLOAD	L	L	H	H															
LOAD	L	H	L	H																		
* Power supply pull-up is performed at target (loading motor driver IC607).																						

* Power supply pull-up is performed at target (loading motor driver IC607).

Pin no.	Signal name	I/O	Function	
33	LM LIM CONT	O	Loading motor driver current limiter on/off control. High = limiter on (pull-up in IC607)	
34	DRUM ON	O	Drum motor driver on/off control. HiZ = ON, Low = OFF.	
35	DRUM FWD/RVS	O	Drum motor rotation direction control. Causes reverse rotation of drum motor during tape threading to detect drum-to-tape contact.	
36	EDIT	O	Goes Low during editing, to set VTR block to edit mode.	
37	TALLY LED	O	Tally LED control. Low = LED ON. Front tally, back tally and inner tally indicators are connected in parallel.	
38	REEL HALL CONT	O	Reel rotation sensor (Hall element) on/off control. Low = ON.	
39	MP	I	Microprocessor specification terminal. Connected to ground.	
40	SS RESET	I	Reset input terminal. Reset at falling edge.	
41	VSS	I	Ground	
42	XTAL	O	11.9 MHz (system clock) quartz oscillator terminal Not activated during standby. (Clock is also supplied from pin 42 via a buffer to ATF IC.)	
43	EXTAL	I		
44	CAM CS	I	Connected to pin 11	At falling edge of CAM CS at pin 44, 8 bit × 8 word transfer starts automatically.
45	CAM SO	I	Serial bus lines to camera microprocessor (IC261)	
46	CAM SI	O		
47	CAM SCK	I		
48	KEY 3 AD	I	CF block Reads function key status through A/D converter. FK block	
49	KEY 2 AD			
50	KEY 1 AD			
51	KEY 0 AD			
52	AVSS	—	Reference voltage input for internal A/D converter	
53	AVREFF			
54	AVDD			
55	HH SENSE	I	Connected to EVER 5 V (When voltage drops, microprocessor operation is terminated.)	
56	TAPE END	I	Pulse input for tape end detection	
57	TAPE TOP	I	Pulse input for tape start detection	
58	PATH MODE	I	Track shift on/off input. Low = track shift.	
59	BATT SENSE	I	Battery end and battery pre-end detection by A/D converter	
60	ATF ERROR	I	ATF error input. Processed by internal A/D converter.	
61	S REEL	I	S reel rotation detection input (A/D converter input)	
62	T REEL	I	T reel rotation detection input (A/D converter input)	
63	ME/MP SW	I	ME/MP detector switch input. High = ME mode.	
64	REC PROOF SW	I	Erase protection switch input. High = recording disabled.	
65	BRIGHT B	I	Used as pair with pin 78 for brightness dial position read-in.	
66	VTR SYNC	I	Composite sync input	
67	Hi8 MP SW	I	Hi8 MP tape detection switch input. High = Hi8 MP tape.	

Pin no.	Signal name	I/O	Function
68	DRUM PG	I	Drum PG input for drum phase servo
69	DRUM FG	I	Drum FG input for drum speed servo and rotation detection
70	CAP FG	I	Capstan FG input for capstan servo
71	MP *E	O	High during recording/playback with MP tape (Hi8 MP tape)
72	ME/MP	O	High during recording/playback with ME tape
73	TAPE LED	O	LED control signal for tape start/tape end detection (pulse output)
74	VA PB	O	Playback mode indication signal. Low = REC/EE.
75	CAP PWM	O	Capstan error PWM signal output
76	DRUM PWM	O	Drum error PWM signal output
77	CAP FG HMS	I	Capstan FG input for linear time counter
78	BRIGHT A	I	Used as pair with pin 65 for brightness dial position read-in.
79	VTR SI	I	Data I/O for serial transfer on VTR bus and clock output
80	VTR SO	O	
81	VTR SCK	O	
82	LP/SP	O	LP/SP switching signal output. High = LP mode.
83	VIDEO MUTE	O	Video mute signal output
84	CLOG DET	I	Clog detection input. High = clogging has occurred.
85	REF PILOT	O	Reference pilot signal output to ATF IC
86	SP/LP DET	I	Active during FF/REW, CUE/REV, EDIT (-)
87	N.C.	—	Connected to ground
88	VSS	—	Ground
89	VDD	—	Power supply for internal microprocessor logic
90	(VPP)	—	EVER 5V
91	PB MUTE 2B	O	Mute signal output for unused video head during playback
92	PB MUTE 1B		
93	PB MUTE 2A		
94	PB MUTE 1A		
95	REC 2B	O	Selector signal output for unused video head during recording. Low = select.
96	REC 1B		
97	REC 2A		
98	REC1A		
99	RF SWP	O	RF switching pulse output
100	1/2 RF SWP	O	1/2 RF switching pulse output

[Pin description of LCD microprocessor IC602 (μ PD75304)]

Pin no.	Signal name	I/O	Function
1 - 8	S12 - S19	O	Segment drive output for LCD segments
9 - 12	S20 - S23	O	Not used.
13	LINE MIX	O	Audio signal left/right channel mixing control. High = mixed.
14 - 20	S25 - S31	O	Not used.
21 - 24	COM0 - COM3	O	Common terminals for LCD drive
25	BIAS	O	Reference voltage output terminal for LCD drive
26 - 28	VLC0 - VLC2	I	Reference voltage input terminals for LCD drive
29	EDIT SW	I	Edit switch input. Low = edit mode.
30	MAIN SW	I	Bilingual switch input. Low = "main".
31	SUB SW	I	Bilingual switch input. Low = "sub".
32	VTR DD ON	I	Backup detection input. Low = backup present.
33	VSS	—	Ground
34	JACK OUT/ $\overline{\text{IN}}$	I	Input/output selector position detection input. High = output mode.
35	WIND SW	I	Wind noise reduction switch input. High = wind noise reduction.
36	Hi8 SW	I	Hi8 switch input. Low = AUTO position.
37	AUTO LOCK SW	I	Auto lock switch input. High = Auto lock.
38	BATT IN	I	Battery detection input. Low = battery present. At rising edge, low-voltage operation is triggered (CPU clock frequency is switched).
39	VTR SCK	I	Serial data transfer terminals (VTR bus)
40	VTR SI	O	
41	VTR SO	I	
42	$\overline{\text{SIRCS IN}}$	I	SIRCS signal input
43	$\overline{\text{LCD CS}}$	I	Input for chip select signal from IC601 (servo/system controller)
44	$\overline{\text{LI PRE END}}$	I	Lithium battery pre-end detection input. Goes Low when lithium battery voltage falls below 2.7 V.
45	E DET	I	Playback Hi8 mode detection input. High = Hi8 mode.
46	$\overline{\text{PB 1.7M DET}}$	I	1.7 MHz carrier detection input. Low = tape is stereo or bilingual.
47	JACK MONO	I	Audio line input mono detection input. Low when plug is connected only to right channel (stereo).
48	$\overline{\text{MIC MONO}}$	I	Mono microphone detection input. Low = mono microphone connected to external mike input.
49	$\overline{\text{S IN}}$	I	S video input/output detection input. Low = plug is connected to S video input/output jack.
50	MX SEL 1	O	Audio left/right channel control signal output. (Refer to section on audio circuits.)
51	MX SEL 2		
52	COMPOSITE REC	O	High during recording of composite video signal
53	$\overline{\text{E/L}}$	O	Hi8/STD mode selection signal output. High = Hi8 mode.
54	VDD	—	Connected to backup VDD

Pin no.	Signal name	I/O	Function
55	XT1	—	32 kHz quartz oscillator terminals, for clock count.
56	XT2	—	
57	N.C.	—	
58	X1	—	Clock connector for system clock. 4.19 MHz ceramic oscillator is used.
59	X2	—	
60	1991/1991	I	Initial value determination terminal for calender setting. Connected to backup VDD (High).
61	MONO	O	Stereo/mono switching output. High = mono.
62	MX ON/OFF	O	Matrix (audio) circuit on/off control signal. High = matrix ON.
63	IN/OUT	O	Line input/output jack input/output selector signal. High = input mode.
64	DST SW	I	Summer time switch input
65	AREA SW	I	Area switch input
66	DATE SW	I	Date switch input
67	TIME SW	I	Time switch input
68	LCD RESET	I	LCD microprocessor reset terminal
69	S0	O	Not used. Outputs 512 Hz (divided from time clock) during 5 V operation.
70 - 80	S0 - S11	O	LCD segment drive outputs (pin 70 is not used).

4-3-1. Function Key Read-In

SS 5V is divided by a resistor network to produce a 6-stage DC voltage (0 - 5 V) which is read by the A/D converter of the microprocessor.

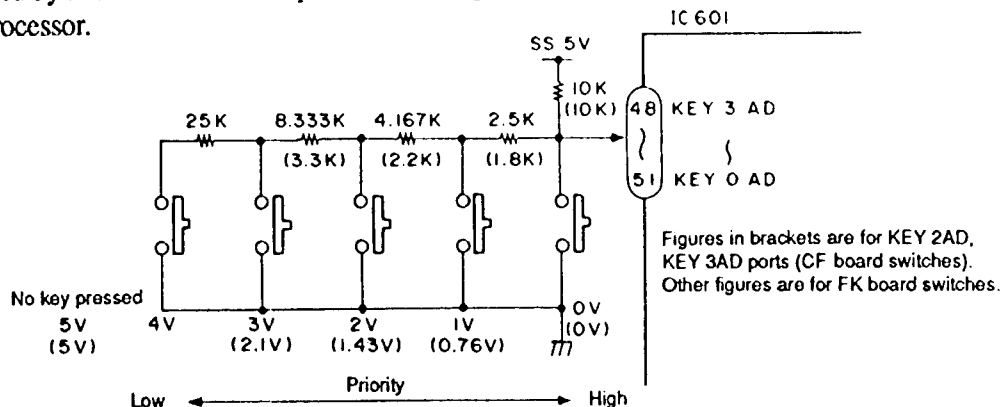


Fig. 4-8

[A/D port assignments]

	1	2	3	4	5	open
FK block	0V	1V	2V	3V	4V	5V
CF block	0V	0.76V	1.43V	2.11V	—	5V
KEY 0 AD	STOP	FF	ZERO MEM	PB	REC	—
KEY 1 AD	PAUSE	REW	RESET	EDIT-	EDIT+	—
KEY 2 AD	TITLE ON/OFF	TITLE COLOR	SHUTTER SPEED	WHITE BAL	—	—
KEY 3 AD	FOCUS ON/OFF	FADER	BRIGHT LOCK	TITLE MEM	—	—

Besides the keys shown above, IC601 also directly reads the following function keys:

- Start/stop key
- Eject key
- 3-position power key
- Cassette control lock switch

These are read also during power-off (IC601 in standby mode). When the input signal shows a falling edge, IC601 is activated (wake-up).

The clock/calender keys are read by IC602 (LCD microprocessor), so that they can be operated also during power-off when the battery is inserted.

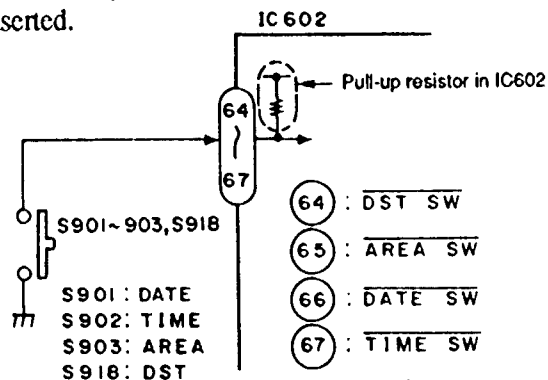


Fig. 4-9

IC602 also directly reads the following keys:

- Edit switch
- Bilingual switch
- Input/output selector switch
- Wind noise reduction switch
- Hi8 switch
- Auto lock switch

4-3-2. Loading Motor Driver Control

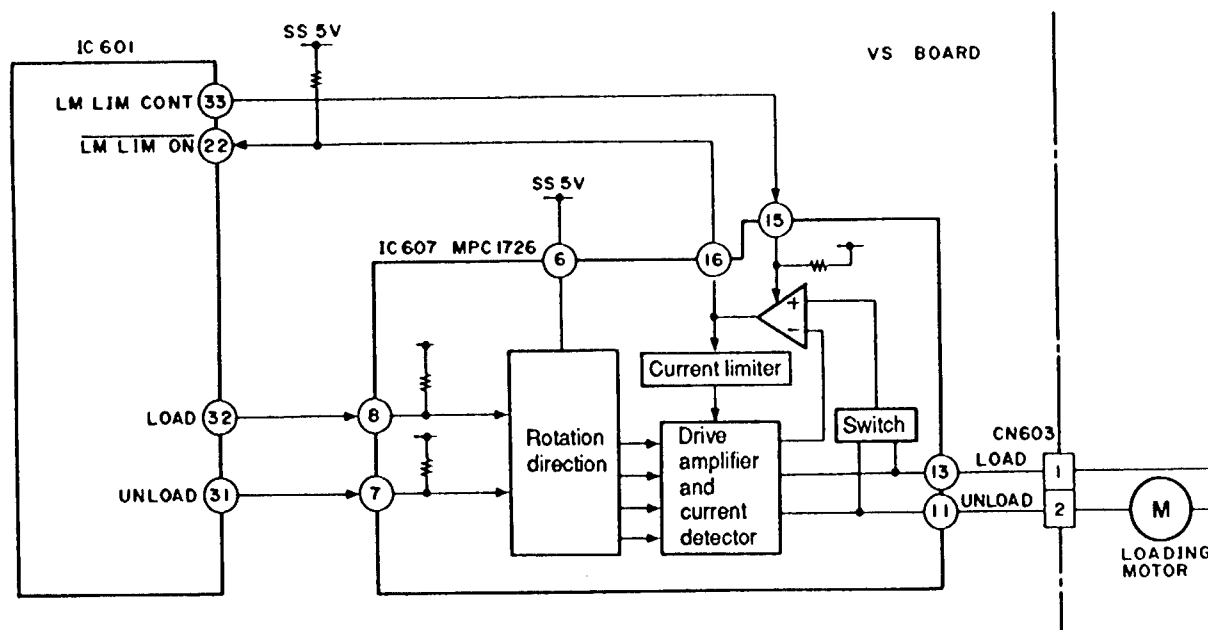


Fig. 4-10

The loading motor serves for cassette loading and unloading (linear skate principle) as well as tape threading and unthreading. The loading motor driver IC607 incorporates a current limiter which can be externally switched on and off and is controlled by the LM LIM CONT signal (pin 33 of IC601). This pin must be High for the current limiter to operate.

From the point when the drum rotation is reversed during loading (reverse → forward) until the end of the loading and tape threading process, the current limiter is turned off to obtain maximum torque from the loading motor. Loading motor on/off and loading/unloading is controlled by the output of pins 31, 32 of IC601.

When the current limiter is active, pin 16 of IC607 becomes Low and sends a signal to IC601. When pin 22 of IC601 becomes Low, a "finger jam" is assumed. When this condition continues for approx. 2 seconds, the loading motor rotation is reversed.

	OFF	Loading	Unloading	Brake
31 UNLOAD	L	L	H	H
32 LOAD	L	H	L	H

4-3-3. Sensor Amplifiers and Detection Circuits

The servo/system controller IC601 uses the circuits shown below to detect errors in order to protect the mechanism and the tape.

- DEW detection
- Reel rotation detection
- Drum rotation detection
- Tape start/end detection
- Battery end detection
- Clog detection and SL/LP detection

A) Dew detection circuit

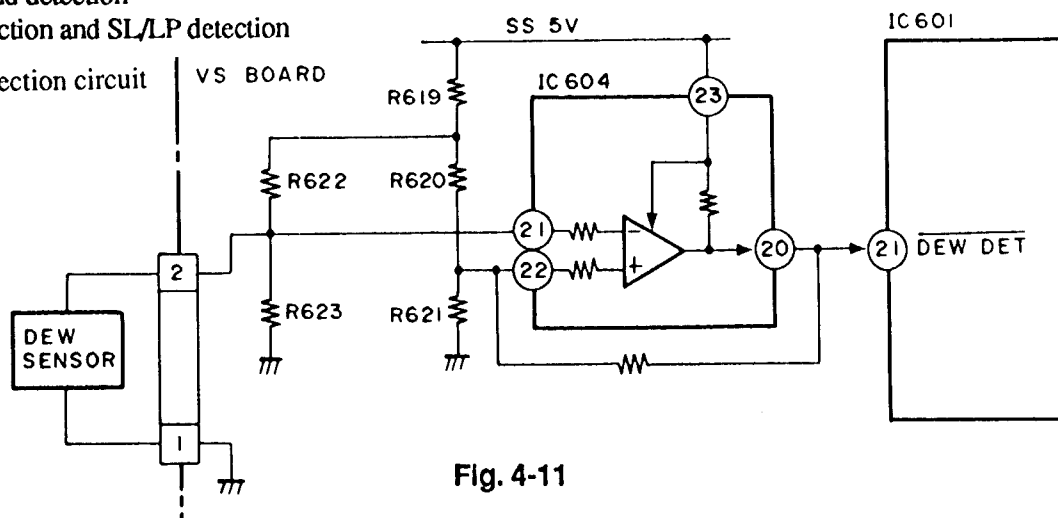


Fig. 4-11

The resistance of the dew (condensation) sensor used in this unit rises when moisture rises. This causes the voltage at pin 21 of IC604 to rise. When it exceeds the voltage at pin 22, pin 20 outputs a Low signal which is input to IC601. During power-off, there is no dew detection.

When dew is detected, the DEW mark appears in the viewfinder and on the LCD. If the tape is currently running, it is stopped immediately. Now all VCR controls except the eject button are inactive.

After dew was detected, the DEW condition is maintained for about 1 hour. Even if the cause is removed in the meantime (DEW DET pin 21 of IC601 goes High), the microprocessor does not return to normal operation. The LCD microprocessor continues to count up to one hour, also while power is turned off. The eject operation during dew detection is called "DEW EJECT" since the drum is stationary and the tape is wound only by the T reel.

B) Reel rotation detection

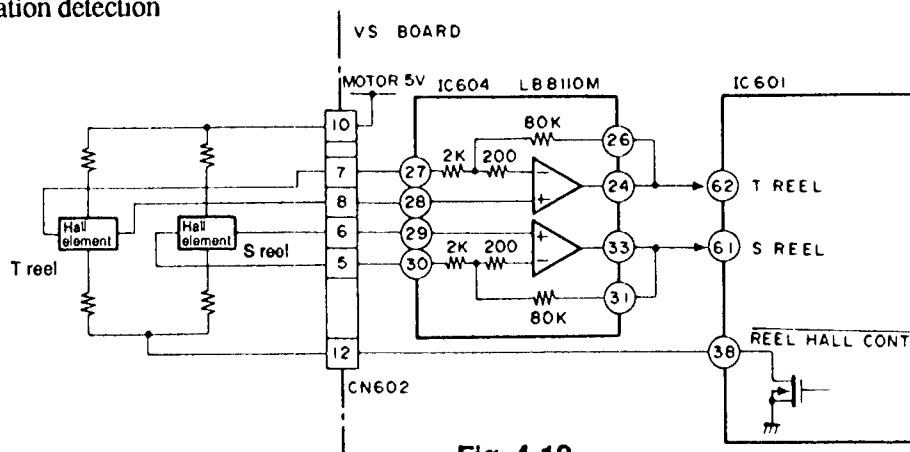


Fig. 4-12

The change in the current flowing through the Hall element by the reel rotation is detected and supplied to IC601 as the FG signal. (The output of the Hall element is amplified by the factor 40 by a differential amplifier.) Besides rotation detection, the reel FG signal also serves for tape end detection. The detection principle is the same as in previous units.

When reel rotation detection is carried out, pin 38 of IC601 causes the internal switch to go ON, so that current flows through the Hall element. At other times, the switch is OFF, to conserve current.

C) Drum rotation detection

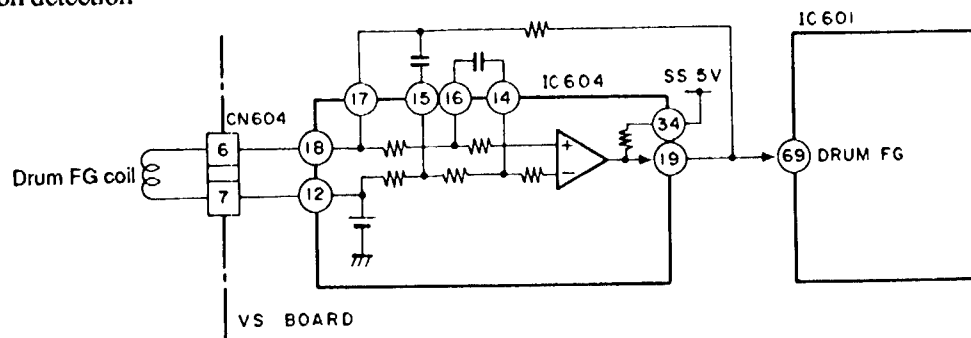


Fig. 4-13

The signal generated in the drum FG coil is amplified by IC604 and input to pin 69 of IC601 after waveform rectification.

When the drum FG signal is not input for a certain interval (the length of the interval differs for the various modes), a rotation error is diagnosed and the drum motor drive stops. Besides eject and power-off, no other controls are now active. The eject operation after drum error detection is the same as after dew detection, i.e. the tape is wound only by the T reel without drum rotation.

D) Tape end detection

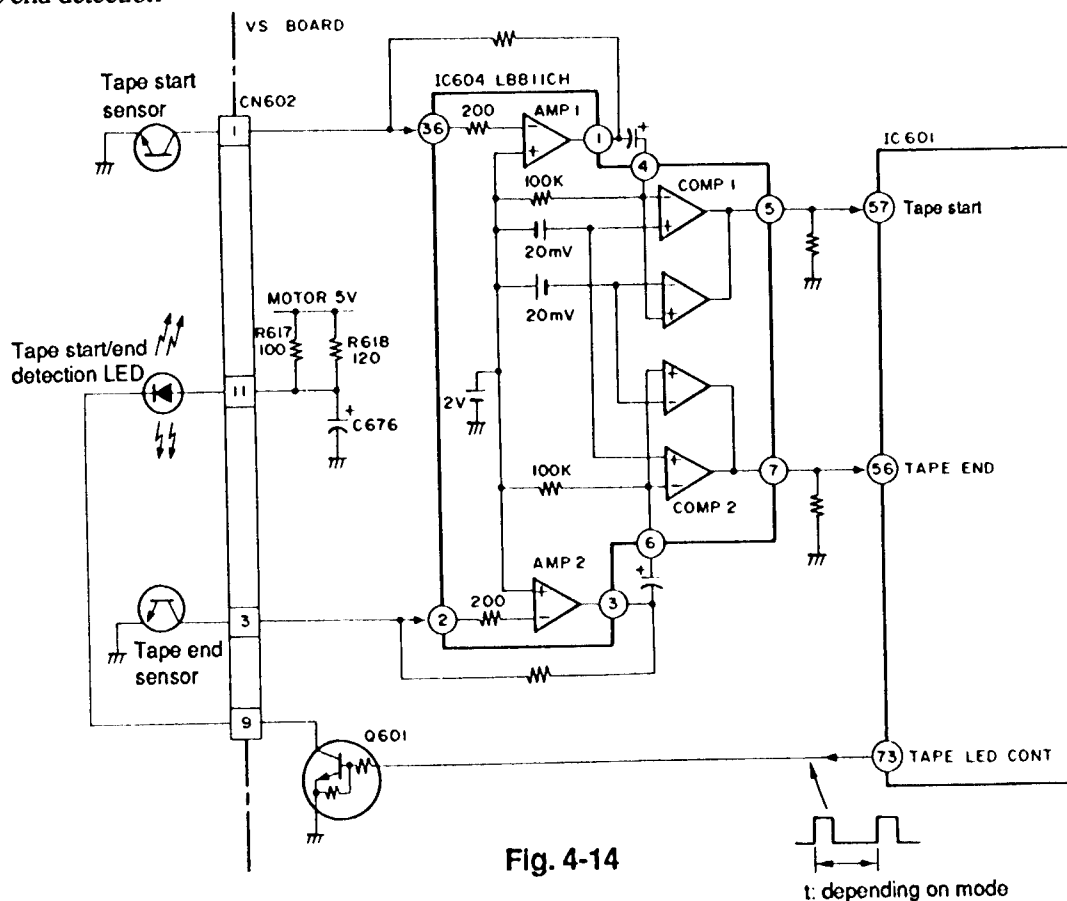


Fig. 4-14

When the tape start and end sensors receive only external light, the positive and negative voltage potential of amplifiers 1 and 2 is equal (2 V) and the negative input of comparators 1 and 2 is less than the comparator threshold level of 20 mV. The output of pins 5 and 7 therefore is Low (external light canceling).

When the tape end or tape start section is reached, the respective sensor connects and the current flow causes the potential of pin 4 or 6 to rise, which in turn causes comparator 1 or 2 to go ON and outputs a pulse (High) from pin 5 or 7.

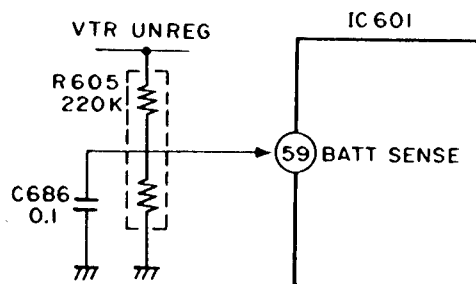


Fig. 4-15

1. Set VTR UNREG to 5.5 V and select the camera recording mode.
2. Check and note the data at page 0, address 02h with the SENSOR LANC. This is the value read by pin 59 of IC601.
3. Write the data to page D, address 02h (camera microprocessor EEPROM).

Battery pre-end detection is programmed into the microprocessor. It is triggered when the voltage at the battery terminals is about 0.8 V higher than the battery end voltage.

Clog detection and SP/LP detection are carried out by the ATF IC (IC603)

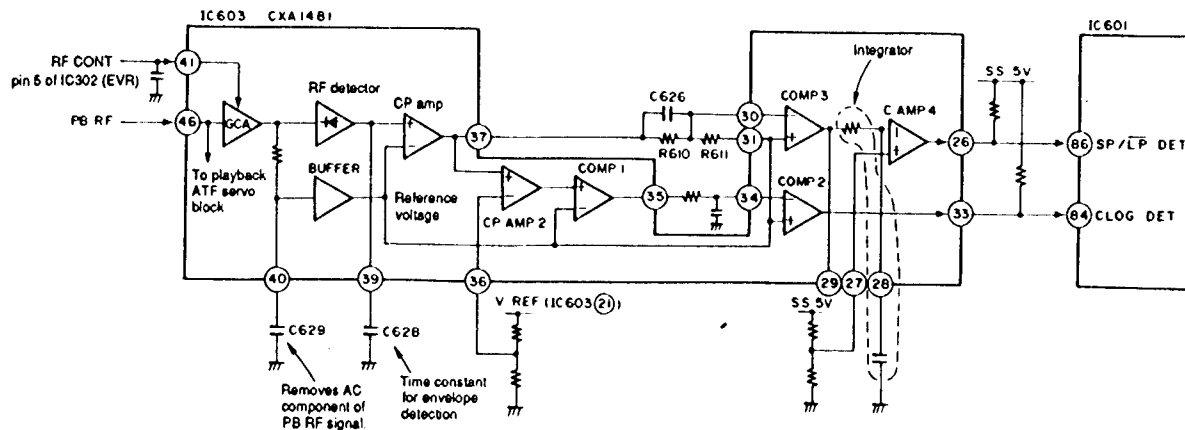


Fig. 4-16

[Clog detection circuit]

The clog detection circuit is active only during the REC -> REC PAUSE -> REC transition intervals. When clogging was detected, the clog mark () appears in the EVF.

The PB RF signal from the RF amplifier is input to the gain control amplifier, where gain is adjusted according to the input at pin 41 (from EVR IC302). The op-amp 1 uses the upper envelope of the signal from the RF detector as positive input and the buffered reference voltage signal as negative input. The differential amplifier result is fed to op-amp 2. (The signal is also output via 37 to the SP/LP detection circuit.)

In op-amp 2, the voltage from pin 36 is used as offset voltage. Then the signal is compared to the reference voltage by comparator 1, and the result is output via pin 35.

In comparator 2, the result of comparator 1 is turned into a logic level and output from pin 33 as the CLOG DET signal. The clog detection threshold level is the PB RF signal. When it is below approx. 100 mVpp. ± 3 dB, "CLOG" is diagnosed.

[SP/LP detection circuit]

As in other units, the SP/LP detection is carried out by detecting the polarity of ATF errors during playback and by detecting the difference in peaks and dips in the 3 RF signal that is produced when video tracks are crossed during cue/review etc.

The RF envelope signal and the reference voltage are differentially amplified. The AC components of the output of op-amp 1 (pin 37) are removed by C626, and the remaining signal is used as negative input of comparator 3. The positive input of comparator 3 is the reference voltage.

In the SP mode, peaks and dips are more pronounced. Therefore, the negative input potential is "lower" than the positive input potential, which causes a High pulse to be output. This is integrated and input to comparator 4, which then goes ON.

In the LP mode, peaks and dips are less pronounced and the output of comparator 3 (and therefore the output at pin 26) remains Low.

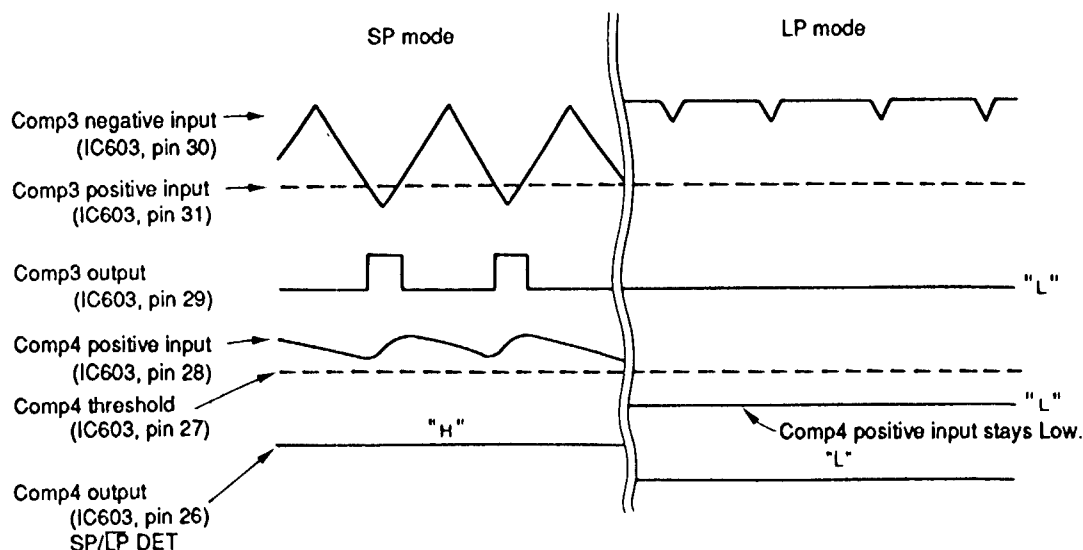


Fig. 4-17

4-3-4. LANC, SIRCS

Fig. 4-18 shows a block diagram of the LANC and SIRCS.

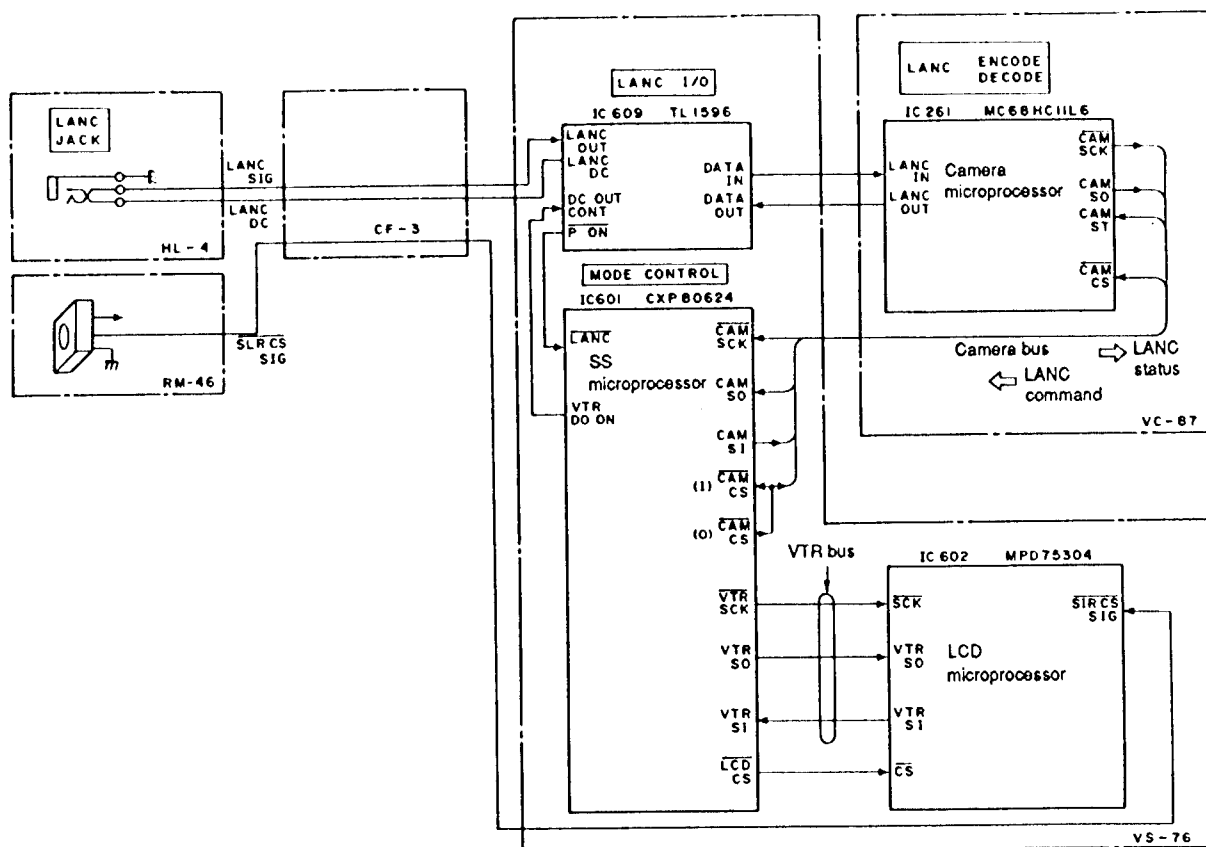


Fig. 4-18

The LANC encode/decode functions are carried out by the camera microprocessor (IC261), except for camera mode 5-minute power-off and LANC power-on after LANC power-off, which are detected by the SS microprocessor (IC601).

The LANC and SIRCS commands cover all functions that are possible with the controls on the unit, except for the EJECT command. This command is disabled because the FL mechanism is used. In addition, LANC and SIRCS control adds the SLOW and STEP commands which are not available on the unit.

SIRCS commands are decoded by the LCD microprocessor and transmitted to the SS microprocessor via the VTR bus.

4-3-5. Power Supply Switching Circuit

Power supply switching is carried out by the IC608.

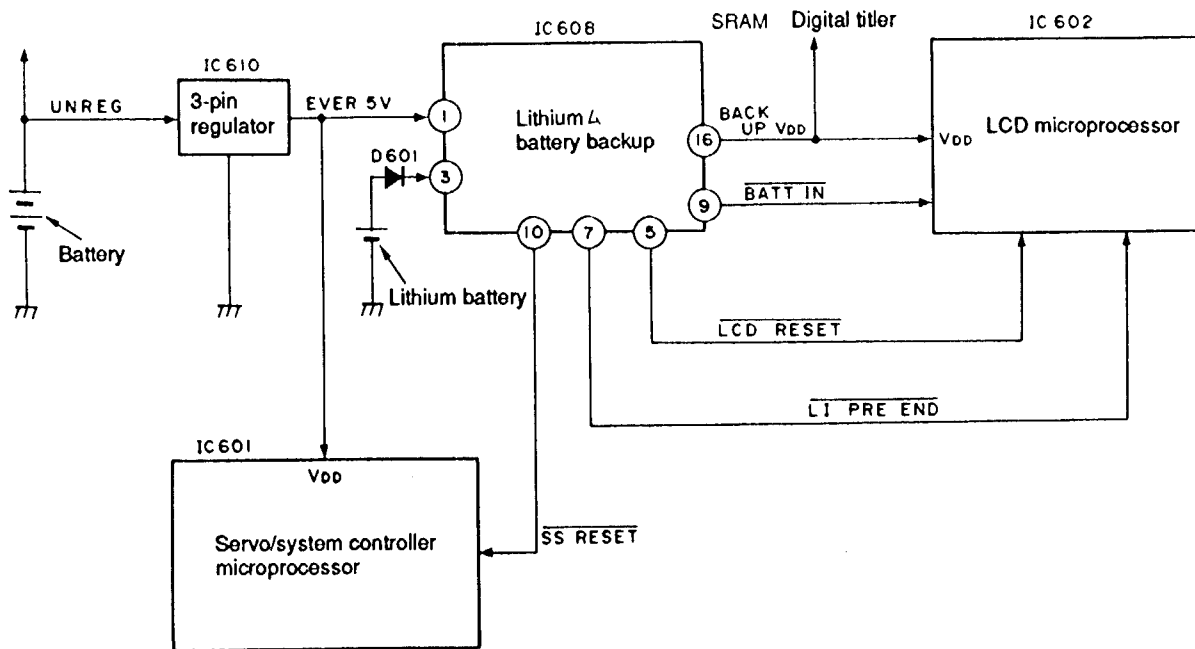


Fig. 4-19

The output of pin 16 of IC608 (BACKUP VDD) is 5 V when a battery is inserted (EVER 5V) and 3 V (for backup) at other times. The BACKUP VDD is supplied to the title memory IC (SRAM IC809 on TO board) and the LCD microprocessor.

The LCD microprocessor switches to low-speed operation when the battery is removed (3 V operation), to conserve power. This condition is indicated by the $\overline{\text{BATT IN}}$ signal output by IC608. This signal is normally Low, but it goes High (3 V) when the battery is removed.

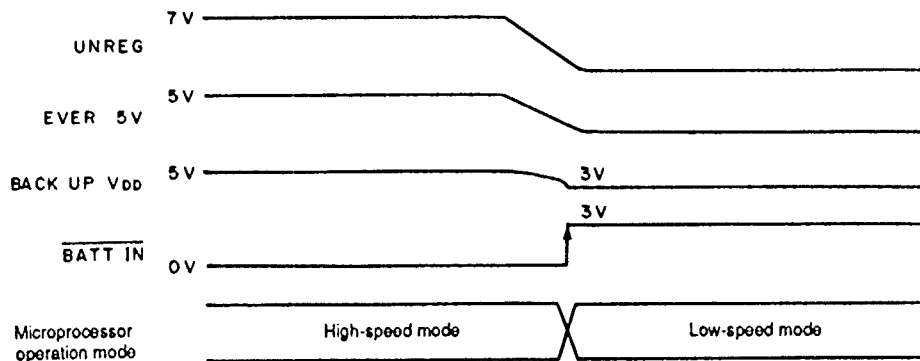
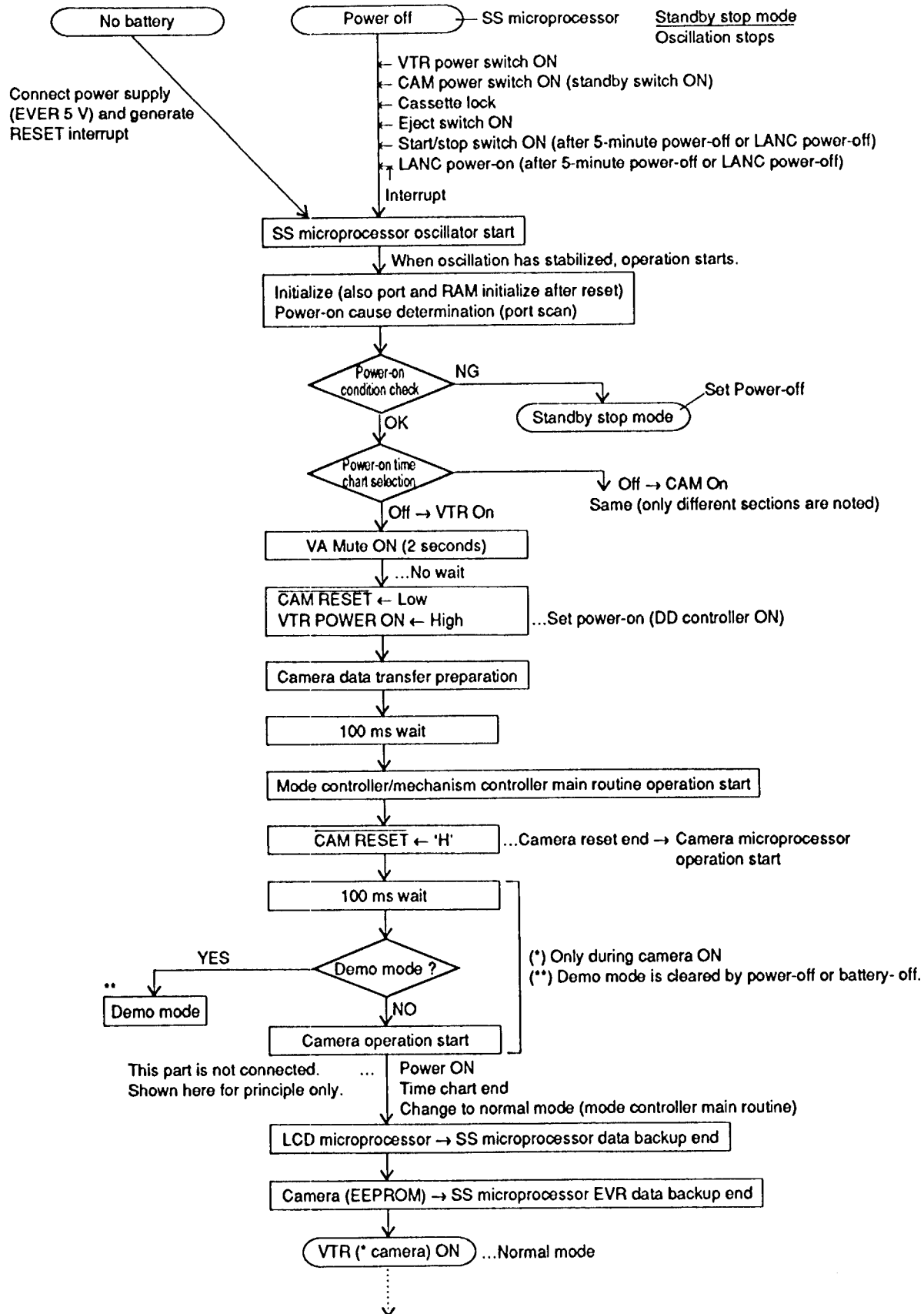


Fig. 4-20

4-3-6. Power-on Flow Chart

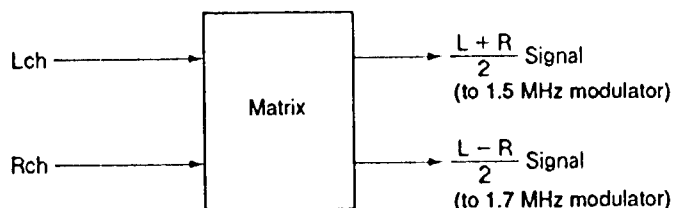


5. AUDIO CIRCUITS

The CCD-TR81 is equipped for HiFi stereo recording.

[HiFi stereo principle]

Compatibility with HiFi mono is achieved by using a matrix approach for the left and right stereo channel



The HiFi stereo principle is also used for dual-soundtrack recording. However, for compatibility with AFM mono, the track 1 and track 2 cannot be matrixed. The sound of track 1 is therefore recorded on the 1.5 MHz side and the sound of track 2 on the 1.7 MHz side. (It enables playing back the sound of track 1 on AFM mono system.)

The matrix circuit can be bypassed during playback, but not during recording. Therefore, dual-sound track recording is not possible.

[Audio line Input/output]

The right-channel jack of this unit's audio line input/output contains a switch which serves to determine whether connected equipment is mono or stereo. (When there is a plug in the right-channel jack, the equipment is regarded as stereo.)

When the equipment is regarded as mono:

- Camera mode
Left and right channels of camera EE sound are mixed and output as monaural signal from the left-channel jack. (Recording is carried out in stereo.)
- VTR mode
Playback: When a tape recorded in stereo is played back, the left and right channels are mixed and output as monaural signal from the left-channel jack.
Recording: The 1.7 MHz carrier is suppressed and the signal is recorded in mono.

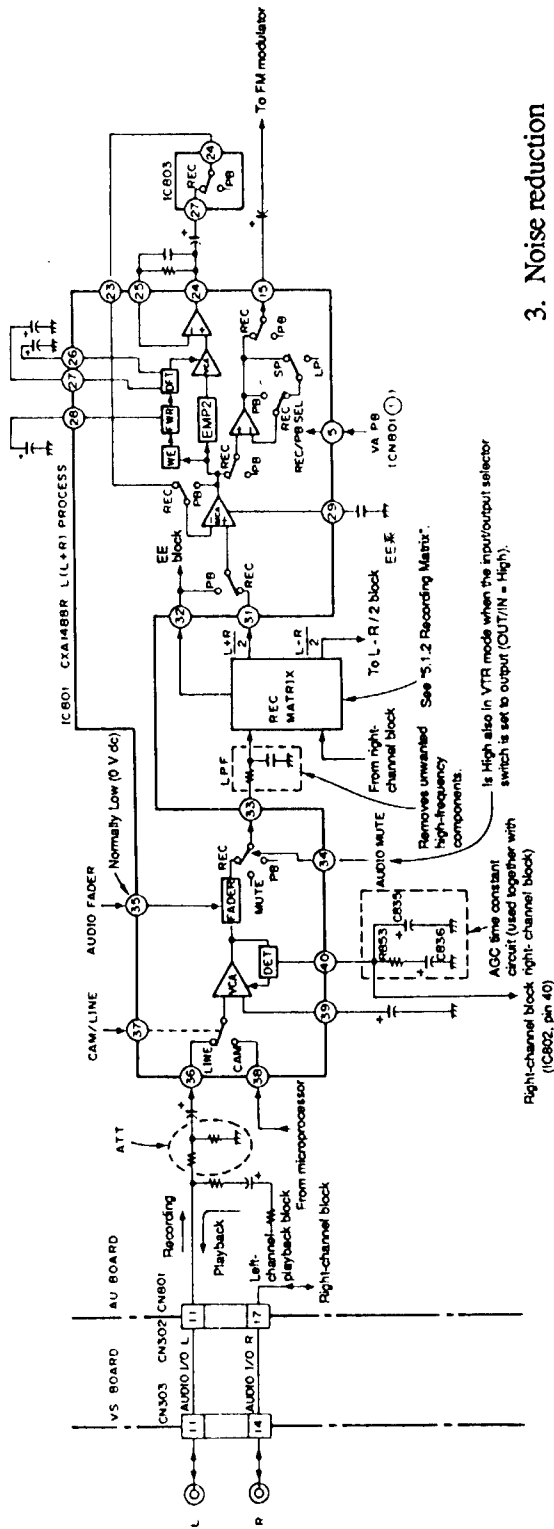
[Monaural recording]

Monaural recording without 1.7 MHz carrier is carried out when there is no plug in the right-channel RCA-type jack, or when there is a monaural microphone connected to the mike jack.

5-1. Recording Circuits

Note: For parts where the left channel and right channel operate in the same way, normally only the left channel (L + R side) is shown.

5-1-1. AGC to Noise Reduction Circuit



3. Noise reduction [Equivalent circuit]

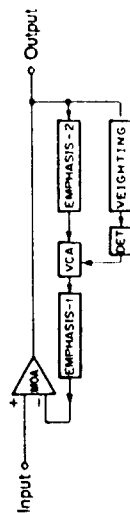


Fig. 5-1

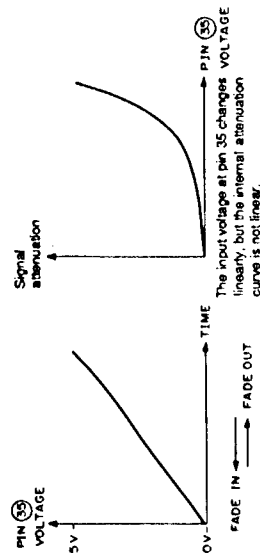
1. IC801, IC802 (CXA1488R) mode switching

- Camera/line input switching: pin 37 CAM/LINE signal (line input = Low)
- REC/PB switching: pin 5 VA PB signal (RE/EE mode = Low)
- SP/LP switching: pin 13 SP/LP signal (LP mode = Low)
- NTSC/PAL switching: pin 43 (pull-up to 5 V with 10k resistor = NTSC)

2. Fader

The AUDIO FADER signal input from pin 35 causes fade-in and fade-out.

The MOA negative input consists of the audio signal whose upper range has been attenuated by the emphasis circuit. To apply preemphasis, the MOA gain is therefore set to be higher in the upper range. The lower the input level to the detector circuit, the higher is the gain reduction by the VCA. For low-level signals, MOA negative feedback is small and MOA gain is high, resulting in a 2:1 compression of the audio signal. The weighting circuit reduces the emphasis amount when the audio input signal contains only high-frequency components, to improve linearity.



Note: Pin 43 also serves as clock input for the PLL circuit. The FSC from the video circuit (NTSC: 3.58 MHz, PAL: 4.43 MHz) is input here.

5-1-2. Recording matrix, EE Block

During recording, the matrix circuit of this unit cannot be bypassed.

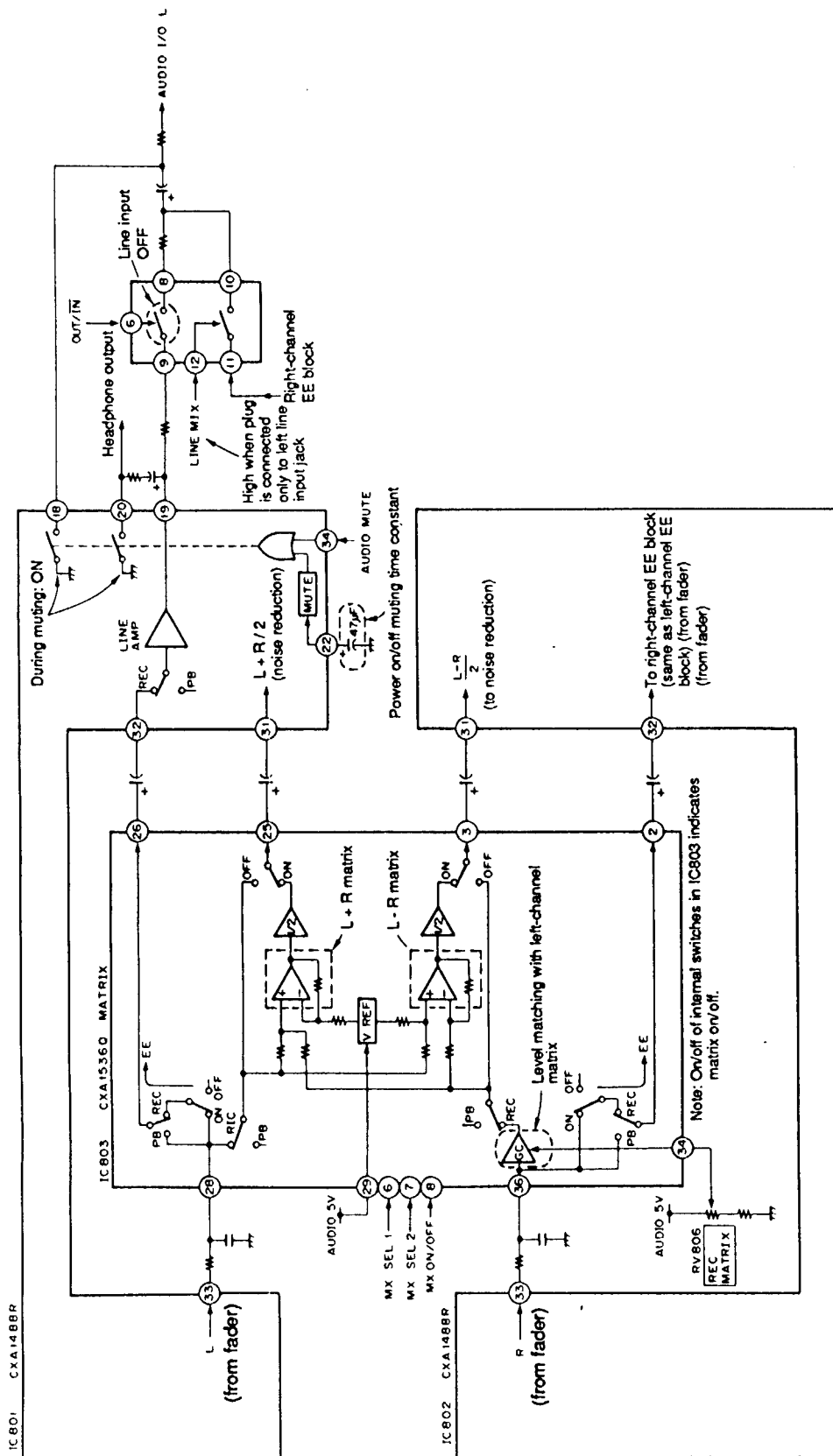


Fig. 5-2

5-1-3. Modulator

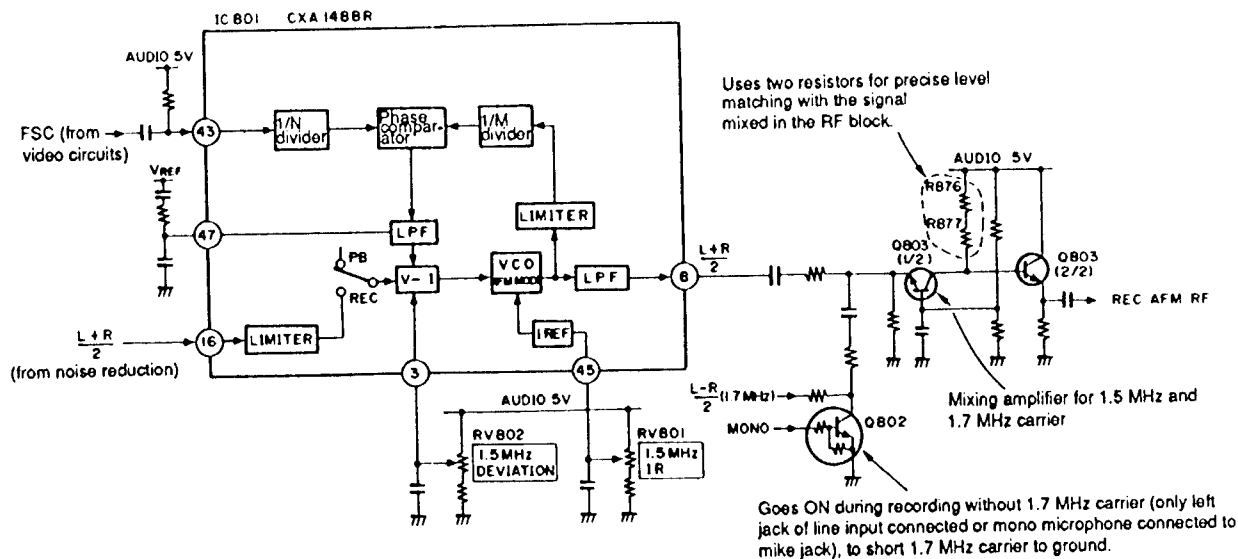


Fig. 5-3

[Phase comparator]

Phase Comparator
Compares the phase of the signal produced by dividing the FSC (3.58 MHz) from the video circuits and the signal produced by dividing the 1.5 MHz (1.7 MHz for L - R / 2) carrier. The phase differential is fed to a V-I converter, to produce an accurate 1.5 MHz (1.7 MHz) carrier which is output from pin 8.

5-1-4. Microphone Amplifier

[Phase compensation circuit]

For stereo recordings, a unidirectional stereo microphone would be preferable, but due to space limitations, an omnidirectional microphone is used in the CCD-TR81. In the lower frequency range, the stereo effect is limited when using this microphone. To improve stereo separation, a phase compensation circuit is used.

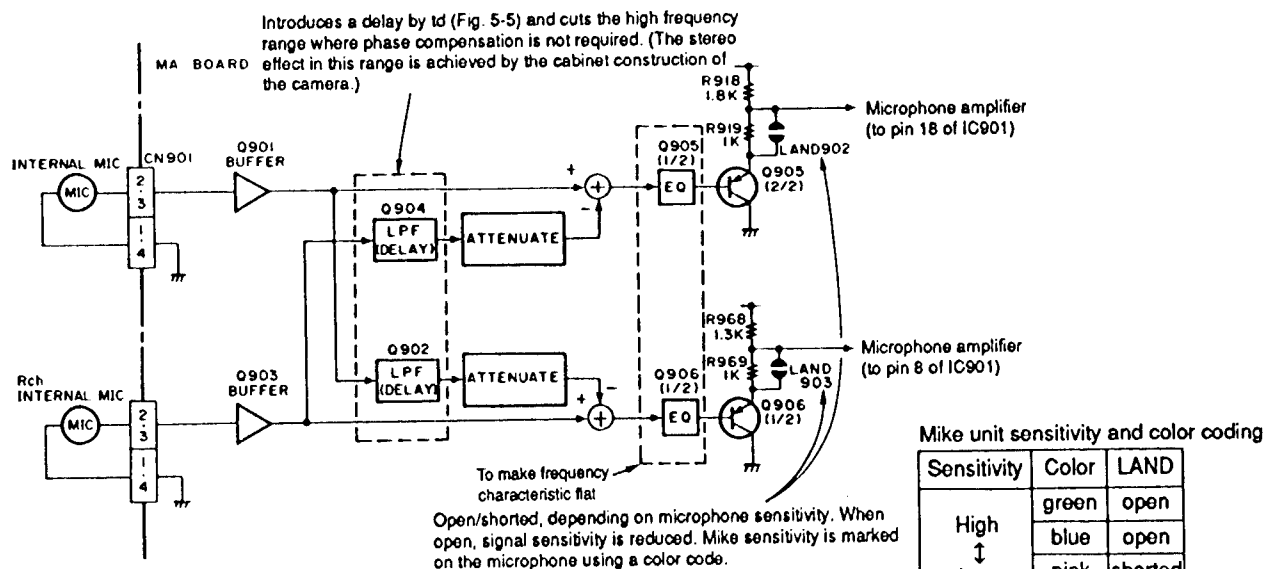


Fig. 5-4

When the sound source is on the left side, the sound reaches the right-channel with the delay t_d (see below). In the phase compensation circuit, the sound picked up in the left channel is delayed by t_d , inverted and subtracted from the right channel, to increase stereo separation.

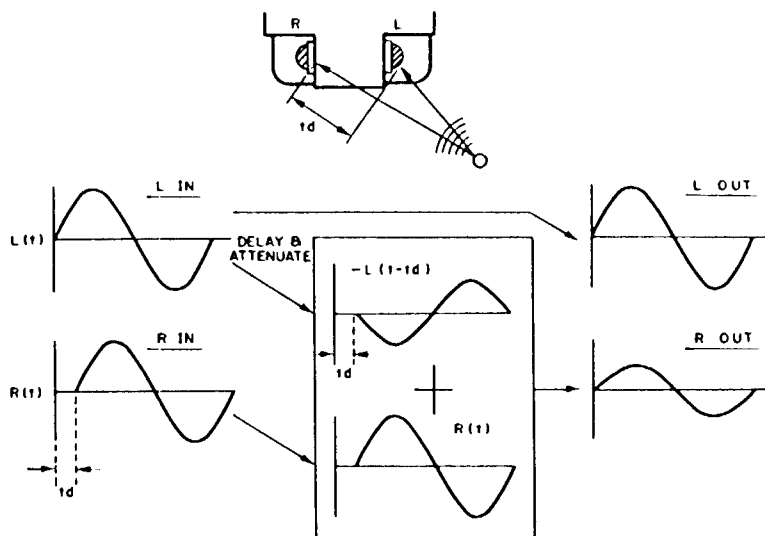


Fig. 5-5

[Microphone amplifier]

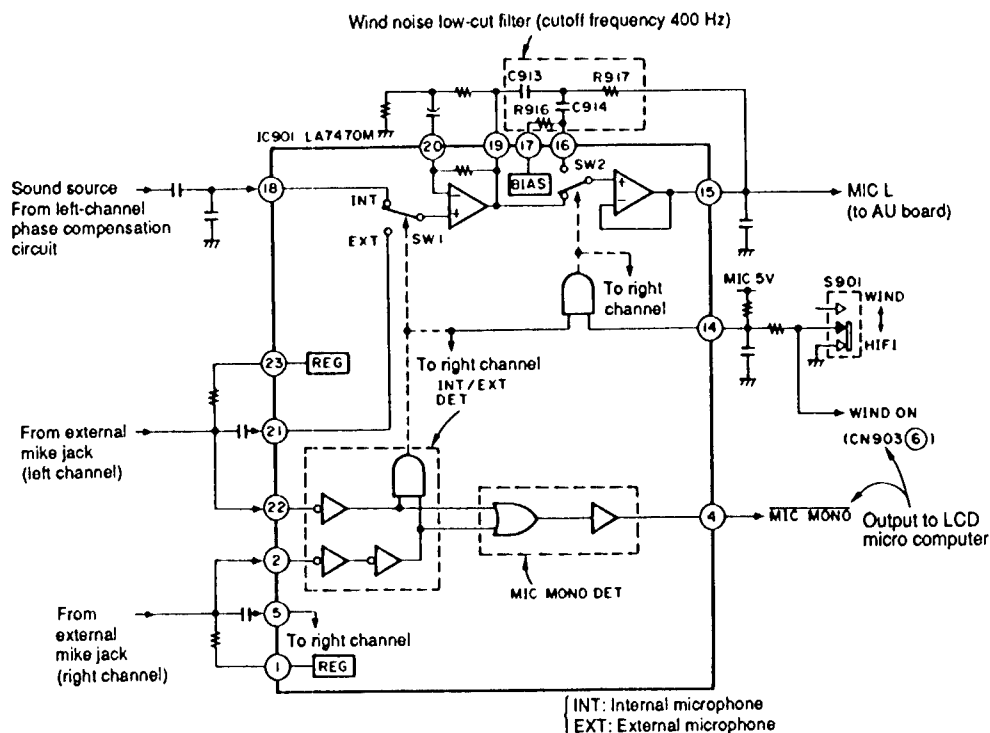


Fig. 5-6

- SW 1

Switches between internal and external microphone. The switching signal is supplied by IC901.

	Pin 22	Pin 2	SW 1	Pin 4
Internal microphone	L	H	INT	H
External microphone	H	H	EXT	H
	H	L	EXT	L
	L	L	EXT	H

Pin 4
High: stereo
Low: mono

- SW 2

Switches between normal and wind noise cut. When the switch is ON, pin 16 is activated and the high-pass filter is inserted in the signal path. During use of an external microphone, the switch is set as shown in the circuit diagram and the high-pass filter is not active.

5-2. Playback Circuits

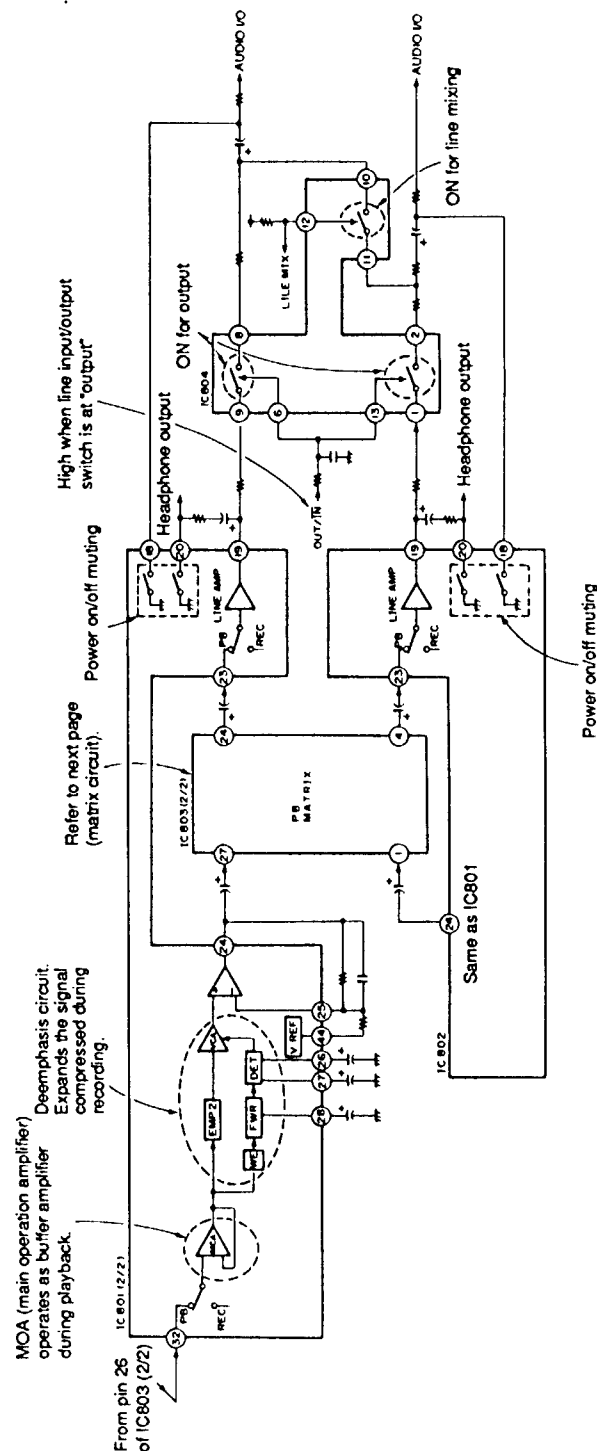
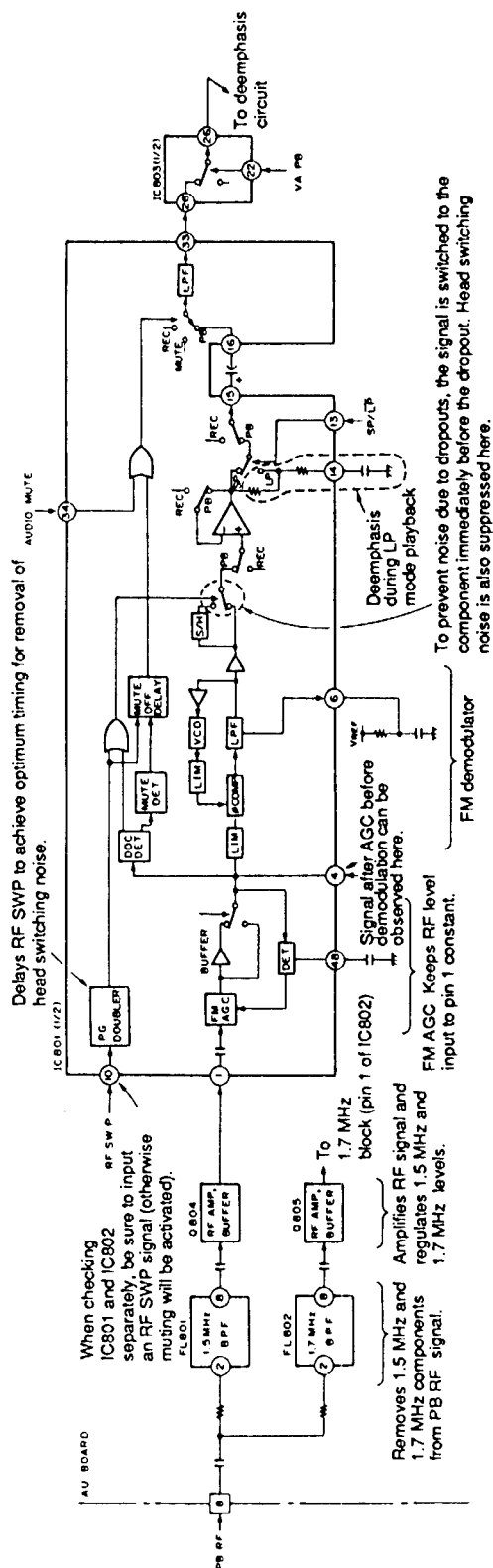


Fig. 5-7

[Playback matrix circuit, 1.7 MHz detector]

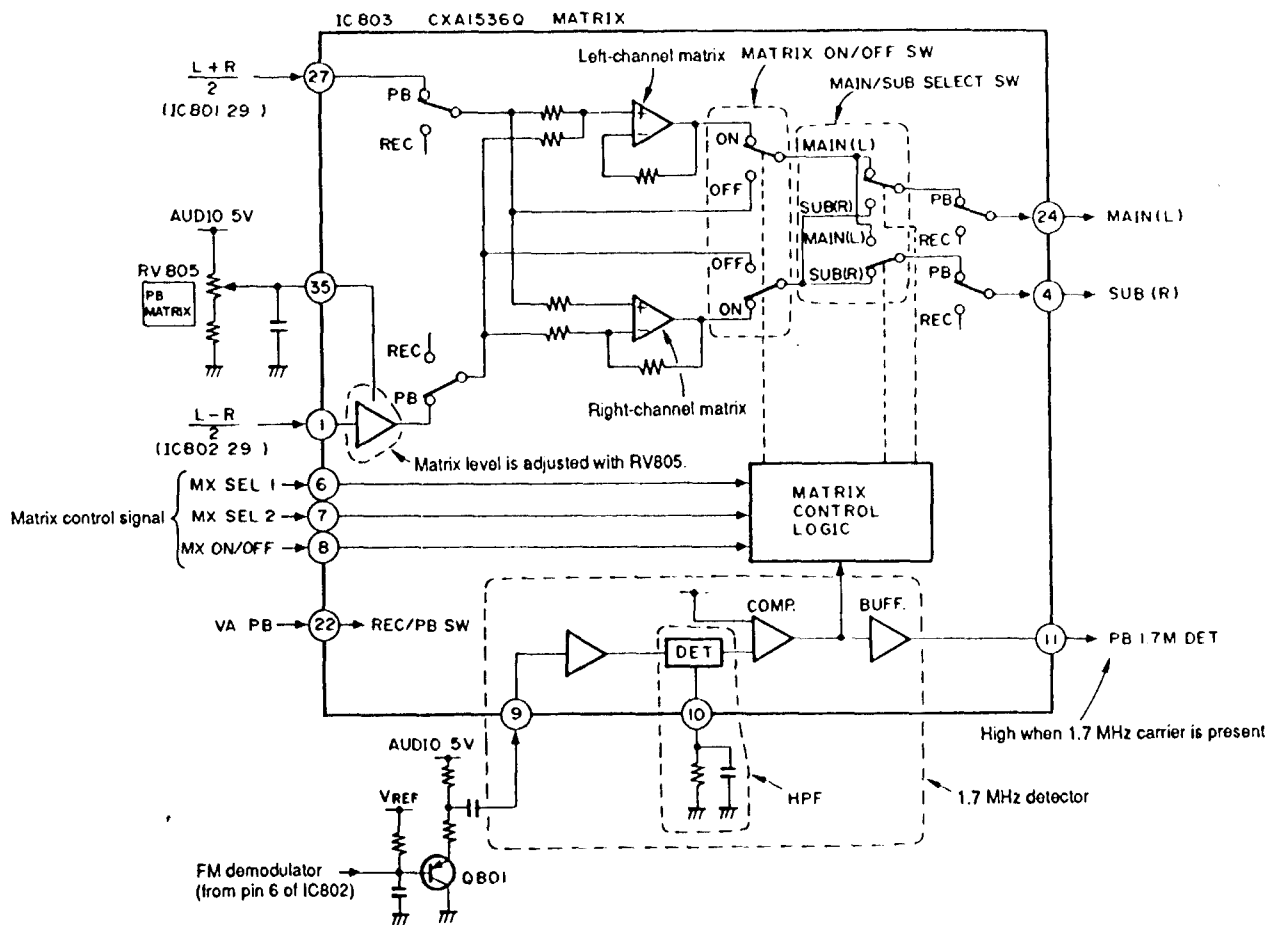


Fig. 5-8

- 1.7 MHz detector

When a tape without stereo or dual soundtrack is played back, white noise appears at pin 9 of IC803. The comparator output is then reversed and pin 11 becomes Low.

- Matrix control signal

IC803 performs switching as follows, depending on the position of the HiFi-sound switch and the tape being played back.

REC

Signal Mode	MX ON/OFF	MX SEL1	MX SEL2	Recorded signal	
				1.5 MHz	1.7 MHz
MONO	L	L	H	MONO	—
ST	H	—	—	$\frac{L+R}{2}$	$\frac{L-R}{2}$

PB

Signal Mode		MX ON/OFF	MX SEL1	MX SEL2	Playback signal	
					L	R
MONO		L	L	H	MONO	MONO
ST	Green position	H	L	L	L	R
	1	L	L	H	$\frac{L+R}{2} (=MONO)$	$\frac{L+R}{2} (=MONO)$
	2	L	H	L	$\frac{L-R}{2}^*$	$\frac{L-R}{2}^*$
Dual sound track	Green position	H	L	L	Tracks 1 and 2	Tracks 1 and 2
	1	L	L	H	Track 1	Track 1
	2	L	H	L	Track 2	Track 2

* Leads to unnatural sound quality.

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